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EDITORIAL

Sylvia P. Beamon

This first larger edition of an annual Bulletin (as opposed to the two a year issued previously) is our attempt to upgrade both the content, allowing for longer papers, and the visual impact. As mentioned before, the newsletter has the function of advertising forthcoming events such as the Study Weekends, both here and abroad, and for disseminating general information.

Like so many societies, our problem with regard to publication has been money, carrying with it the cutting of costs, consequently, inferior produced publication. This is not a reflection on those of us who have struggled to produce it, but just the facts; duplicated or photocopied material does not have the quality of typesetting and expert printing. We have increased our subscriptions to pay for the improved Bulletin. With a better production we are more hopeful of obtaining grants towards further publication costs. We would be glad to hear members' comments on this new issue, also if you know of anywhere we could approach for grants.

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The bulletin has been compiled by Sylvia P. Beamon with assistance from Nick Catford, Deryck Laming and Jenny Plummer.

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A complex of tunnels at Langton Priory, Guildford

Richard W. Williams

About three quarters [1200m] to the S of Guildford stands the familiar landmark of St. Catherines Hill with its ruined chapel. About 200 yards [180m] to the N is a low escarpment marking the southern limit of the chalk of the North Downs and on this prominence stands an imposing house known as Langton Priory overlooking the River Wey. It was never a priory and was only given this name in about 1910; it was rebuilt in 1840 by a local chemist, William Emlyn, and called Weycliffe, a much more suitable name.

A map of the area is shown in figure 1, which is based on the Tithe Map of 1841 with earlier and later features added. In a depression to the N of Langton Priory, standing on the floor of a disused chalk quarry, is an interesting building called the Moat House. This was originally the coach house and stable for the large house and never had a moat – another misnomer! It has an ornamental tower, apparently a hayloft originally, in the form of a church tower.

At the eastern end of the courtyard is the blocked-up mouth of a brick tunnel over which the carriage-drive runs.(fig 2) The floor of the tunnel is below the level of the courtyard, which may be significant in attempting to date the tunnel. The tunnel is aligned towards the river (which has been navigable since 1764) and to enter it a walk along a footpath under an ornamental brick arch is required. There is a gap between butresses in the foreground; on the northern side of the tunnel opposite this gap is a stone wall with a gothic style entrance arch opening on to a passage crossing the tunnel at right angles at the gap referred to, and leading to steps up to an ice-house. The plan,(fig 3) makes this clear and the photograph(fig 4) shows the passage and the steps.

The passage has a curved roof, continuing into the ice-house to form its roof in place of the usual dome found in this type of egg-shaped structure. This feature, together with the fact that the ice-house and the passage walls are crudely built, apparently with re-used material, suggests that the ice-house was inserted into an existing brick construction. Similarly, the external stone wall with the "gothic" entrance appears to have been built onto the brick tunnel complex.

On each side of the "gothic" entrance, holes in the stonework reveal the continuation of the arched roof of the ice-house and passage. Inside the right-hand cavity(fig 5) the roof is visible, and barrel-vaulting where another bricked-up tunnel joins it at right angles; it is possible to peer into this tunnel through a gap in the brickwork and see that it runs parallel to the lower tunnel, towards the Moat House, although there is no sign of it on the surface where it would emerge above the drive. The plan,(fig 3) based on a tape/compass survey by John Henderson and Harry Pearman of the Chelsea Speleological Society in 1983, when these tunnels were first reported to the Surrey Industrial History Group, shows the layout described.

The upper tunnel(fig 3) is entered from a depression beside the Moat House drive.(fig 2) Due to fallen soil it is only just accessible by sliding in backwards at roof level, but once inside a perfectly preserved tunnel is observed, narrow at first but soon widening. It takes a turn to the left and then ends in a rough brick and stone blocking wall at an angle to the tunnel axis. Messrs. Pearman and Henderson discovered, by using caving techniques, that this is at the back of the ice-house wall. The roof of the upper tunnel is, in fact, the roof previously observed in the ice-house and passage.

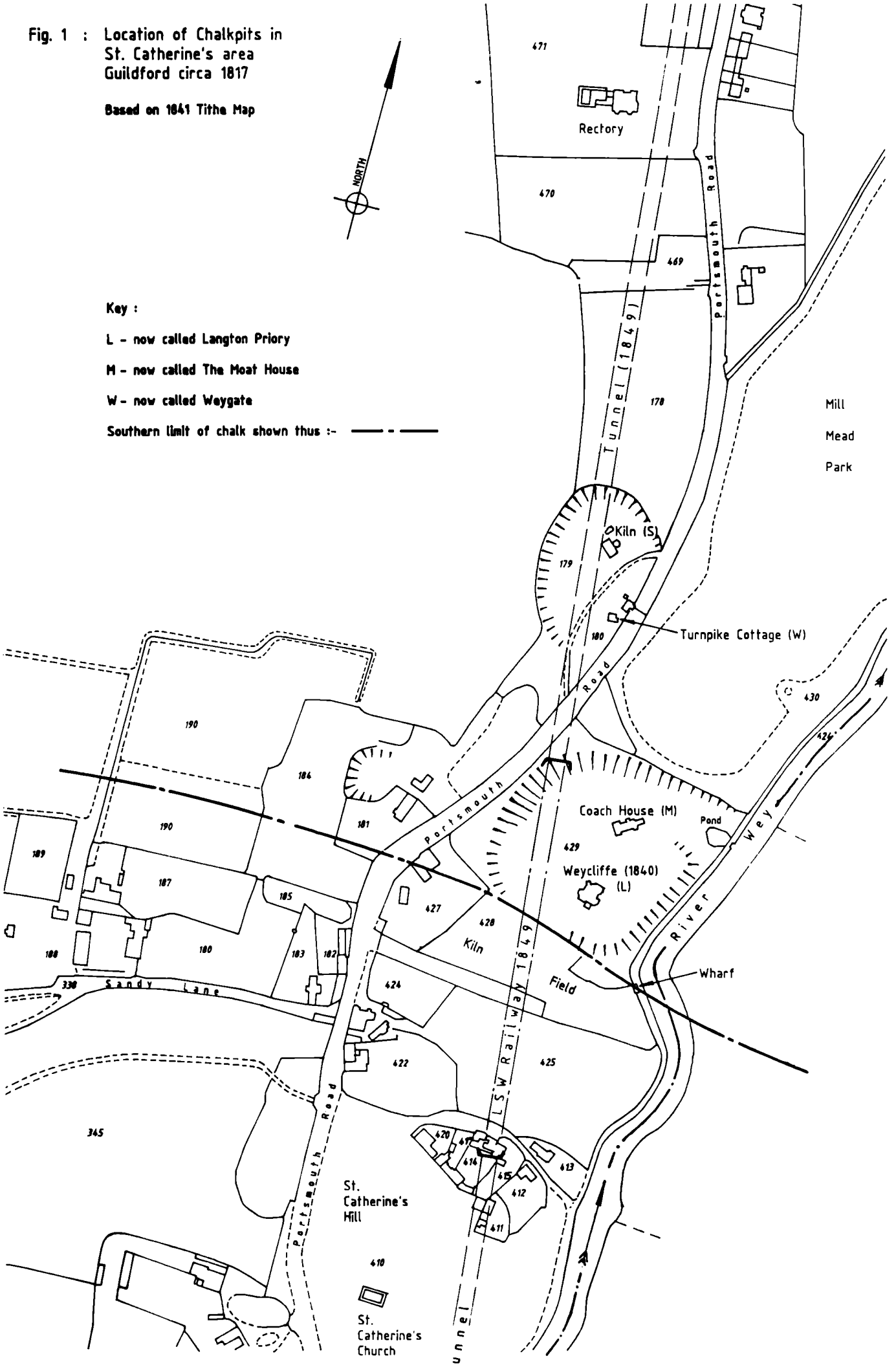
Imagining the ice-house and passage walls removed, there is thus an unusual construction of two tunnels, one at a higher level than the other, at an angle of about 30 degrees initially but finally crossing at right angles, plus an additional tunnel roughly parallel to the lower tunnel but at the level of the upper tunnel. No obvious functional purpose suggests itself for such an arrangement, so it is necessary to consider the possibilities.

Any explanation must also account for three shaft-like holes in the tunnel roofs, one near the lower tunnel entrance, a second above the crossing point of the tunnels and the third above the ice-house door position.(fig 6)(see plan, fig 3) These do not extend to the surface and the two in the upper roof have iron hoops inserted, and rough iron beams placed across, supported by the ice-house passage walls as though inserted to support a load; the holes themselves would appear to be contemporary with the original tunnel brickwork, but not the iron-work which is crudely and irregularly added.

Considering first the ice-house, a small pond near the river, fed by a culvert under the towpath, would be the source of ice and blocks or chunks could be hauled up via the lower tunnel. Possibly, a cable could be suspended from the iron beams under the "shaft-holes" to allow a container to be lifted up to the ice-house loading door more easily. The tunnel

Fig. 1 : Location of Chalkpits in St. Catherine's area Guildford circa 1817

Based on 1841 Tithe Map



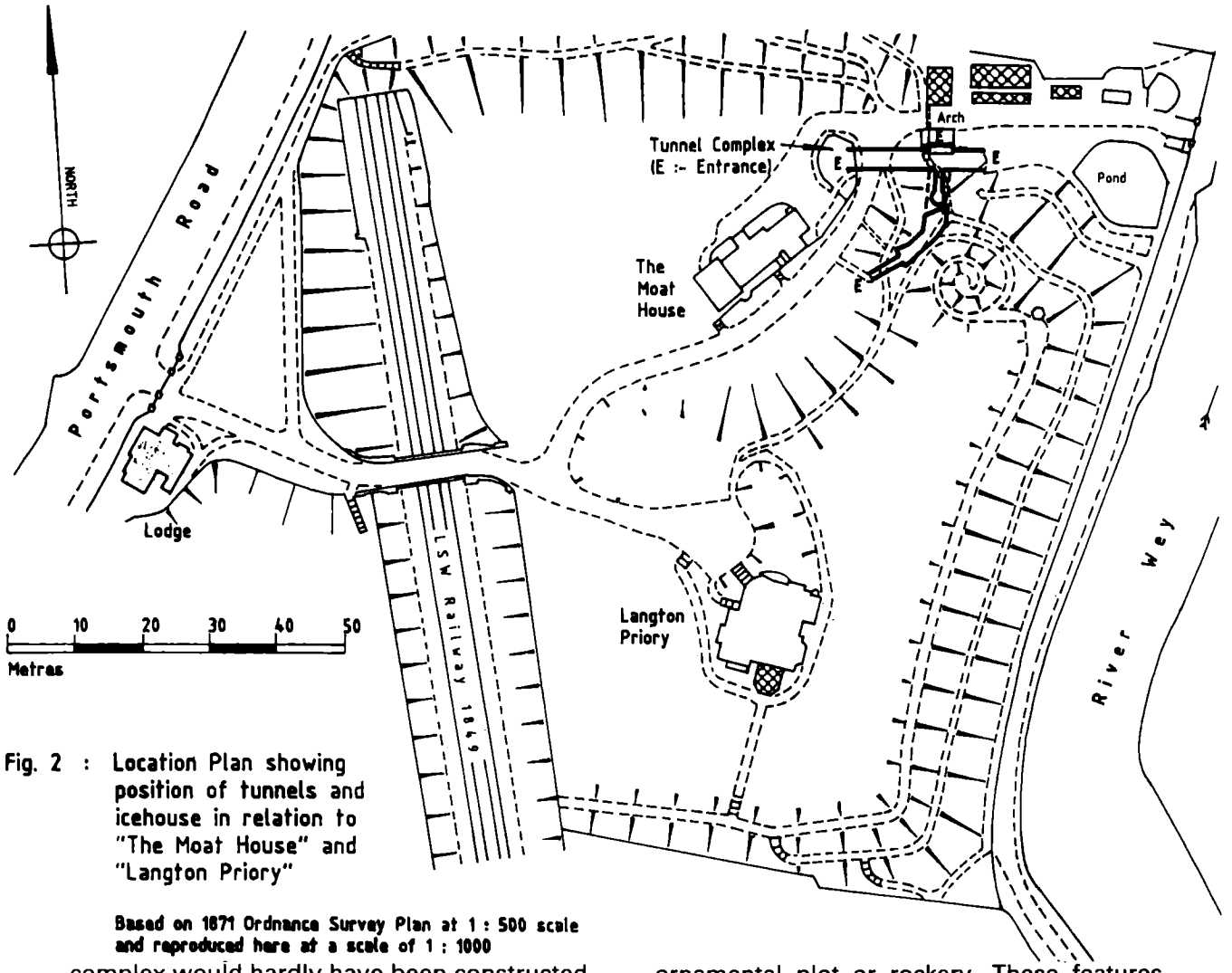


Fig. 2 : Location Plan showing position of tunnels and icehouse in relation to "The Moat House" and "Langton Priory"

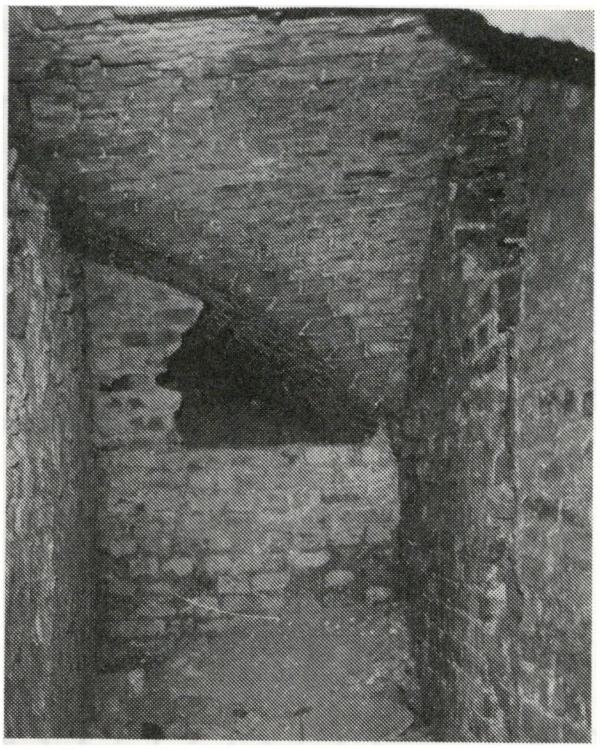
Based on 1871 Ordnance Survey Plan at 1 : 500 scale and reproduced here at a scale of 1 : 1000

complex would hardly have been constructed for this purpose alone, however, as mentioned the ice-house has been built into the existing brickwork and the upper tunnel became blocked off after the ice-house was built. Ice-houses of this type usually have simple narrow access passages let into the hillside or mound in which the ice-well is built, with only the rare mechanical aid to loading.

The next possibility considered is that the whole structure was an elaborate "folly". Owners of large houses did sometimes build odd structures and tunnels for their own and their guests' amusement. In the absence of "grotto" decorations such as shells, minerals or fossils, of which there is no sign, or "romantic" vistas from the tunnels, this complex would have provided very little entertainment! The grounds do contain some folly work, such as the gothic entrance to the side of the tunnels, a high wall with niches joining the hillside containing the tunnels to a disused quarry face (in which the tall brick arch is built over the footpath to the river), some derelict sandstone features against the upper tunnel entrance beside the drive, and a small "hermit cell" above the quarry face at the northern corner of the site. These are probably the features visible in 1846, when Russell's Guide to Guildford stated "...the site was originally a limestone quarry, since formed into most romantic grounds". The blocked-up end of the lower tunnel was also surrounded by a small ornamental plot or rockery. These features leave the impression that they were designed to disguise the tunnel complex, whilst retaining it for the purpose of installing the ice-house and no doubt using the roomy tunnels for storage.

In passing, it must be noted that the Guildford-Godalming railway, opened in 1849, cut right through the grounds of "Weycliffe" which the L & SW Railway Co. purchased in 1847 and resold in 1850, thus terminating any further development by the original owner. The new owner built greenhouses against the old quarry face nearest the river, as shown by the 1871 O.S. map.

The final possibility, then, which the writer favours, is that the tunnel complex dates from the chalk quarrying period prior to 1832 when the grounds were first acquired by Mr. Emlyn. The whole four acre area, later occupied by Weycliffe and its coach-house, had been intensively quarried for chalk and limekilns built, probably starting soon after the Godalming Navigation opened in 1764.(fig 1) A lithograph of 1821 by F.Nicholson (held by Guildford Museum) shows a large irregular hill of bare chalk with the cleft in which The Moat House now stands clearly drawn. It had been extensively made up and levelled by 1833 as shown by the Monroe drawing of that date (reproduced in the Surrey Advertiser on 16 September 1977).



Inside the cavity between the ice-house passage wall and the wall blocking the additional upper tunnel (to the right). The Upper Tunnel is at the rear.

A man called John Henry Grellier held a lease on at least part of this quarry from 1810 until he became bankrupt in 1815, and was granted permission to "erect limekilns and engines" and to make "railroads and ways over and under ground to the Navigation". It appears from a draft statement surviving from the time of his bankruptcy hearing that he did not, unfortunately for industrial archaeologists, actually lay railroads, but he did build kilns, a counting house and "erected engines". He was a man who favoured mechanisation and although no surviving documents indicate exactly where he built kilns and other structures, Grellier was clearly the sort of man who might have mechanised the Moat House quarry and perhaps built the tunnels for some functional purpose. He had a relative, James Grellier (brother?), who quarried marble at Babbacombe and quarried for Roman cement manufacture on the Isle of Sheppey; he used steam engines and other machinery and laid railroads (and also became bankrupt!) Thus J.H.Grellier might have emulated his methods.

There were certainly limekilns on the S side of Langton Priory in the field called Kiln Field(fig 1) and the Monroe drawing of 1833 shows the artist's impression of a kiln, albeit looking incorrectly like a pottery kiln! This may have been the site of kilns referred to in an agreement of 1807 involving a lease to a Thomas Jefferys, but it is likely that kilns were built elsewhere and probably in the vicinity of the Moat House quarry face, although there is no sign of limekilns within the tunnel construction. A wharf stood at the foot of Kiln Field,(fig 1) this was used for unloading coal and loading chalk and lime for delivery down river, even to London for the building trade. There was a big demand in the first decade of the 19th century for the building of London docks.

Quarrying at the Weycliffe site probably ceased by 1826, though continuing on the other side of the Portsmouth Road near the turnpike (fig 1) where the foot of Guildown Road is today and where lime was produced into the 1840's. Therefore if the functionally mysterious tunnels were associated with quarrying, they must be earlier than the 1820's. It is hoped that further clues may come to light in the course of improvements being made to The Moat House grounds by the present owner.

To add to the complication of the area, near the Guildown Road quarry, on the site of the toll-house and cottage (fig 1), stands a late Victorian house called Weygate; under its lawn is another rubble-filled tunnel entrance, not apparently related to the railway tunnel which is at a much deeper level, and unlike The Moat House tunnels not related to a large mansion unless, of course, built for Weygate which seems unlikely. By lying flat, it is possible to look inside and see a large brick tunnel with a narrower one ahead, appearing to be of the same age and design as those at The Moat House. The narrower end very much resembles the access to a limekiln draw-hole, but this was not the site of kilns at the time of the Tithe Award (1841) and the site would have been outside the quarry boundary and very close to the toll-house, an unlikely site for lime burning. Moreover, a cottage stood here by 1831 and some old brickwork resting against an exposed section of the tunnel roof may be from this cottage; this would suggest that the tunnel predates it.

Lower tunnel – the ice-house passage crosses the tunnel from left to right at this point. The ice-house is to the left.

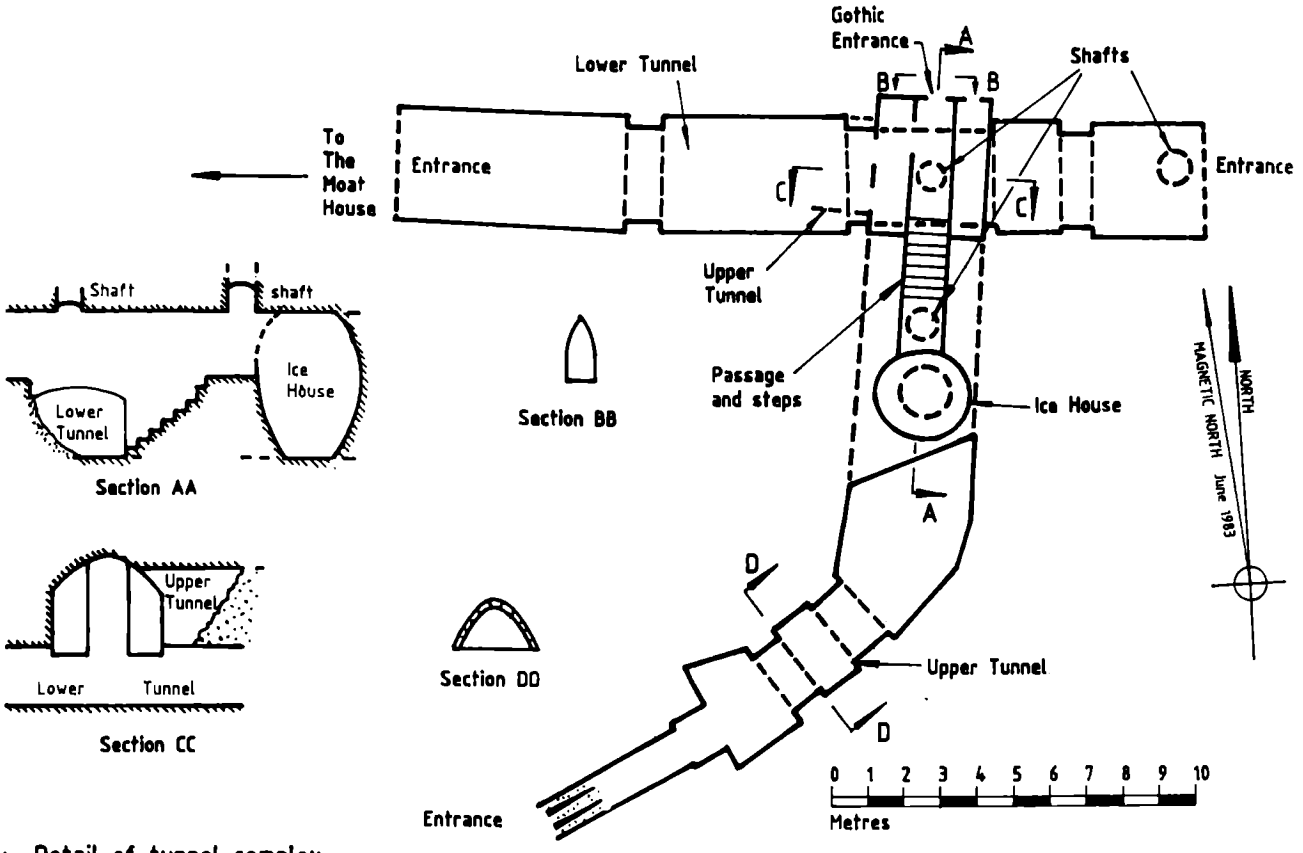


Fig. 3 : Detail of tunnel complex

Based on a survey by J B Henderson and H Pearman

J.H.Grellier, mentioned above, also held a lease on this quarry over a period overlapping his lease on the Weycliffe area, and he took a new lease on it in 1817 (his lease on the Weycliffe area having been reassigned after his bankruptcy); the new lease also included a smaller quarry to the SW, shown in fig 1, and a right of way to the river over the field later known as Kiln Field. It is tempting to assume some relationship between the Weygate tunnel and those at The Moat House, especially as the former is aligned towards the Weycliffe quarry area – and Grellier had in 1810 permission to make ways "over and under ground" – but the Weygate tunnel would have to slope very steeply to pass under the turnpike road, possibly as much as 1 in 7 although no surveying has yet been done to examine this possibility. Yet another puzzle remains to be solved.

Note: It must be stressed that all the features mentioned in this paper are on private property. The author gratefully acknowledges the help of Mr. and Mrs. R. Dunning of "The Moat House", Mr. C. Avery of "Weygate" and Messrs. Leach, Bright and Co. of Langton Priory. The assistance of Mrs. S. Cooke of Guildford Muniment Room in unearthing relevant archives is also most gratefully acknowledged. Thanks are also due to Matthew Alexander of Guildford Museum for assistance in copying maps and drawings.

An underground stone quarry in Durlston Country Park, Purbeck

Christopher Bayley

During the autumn of 1986 members of Subterranea Britannica visited Purbeck with a view to holding a study weekend in the area. Places visited included the cliffstone workings near Swanage and Worth Matravers, the new stone mining museum at Langton Matravers and a shale mine near Kimmeridge.

During one of these visits it was found that the Durlston Country Park staff were in the process of clearing the entrance to one of the inland underground quarries (actually an outcrop working, see Fig 1), whose entrance lies on a nature trail.

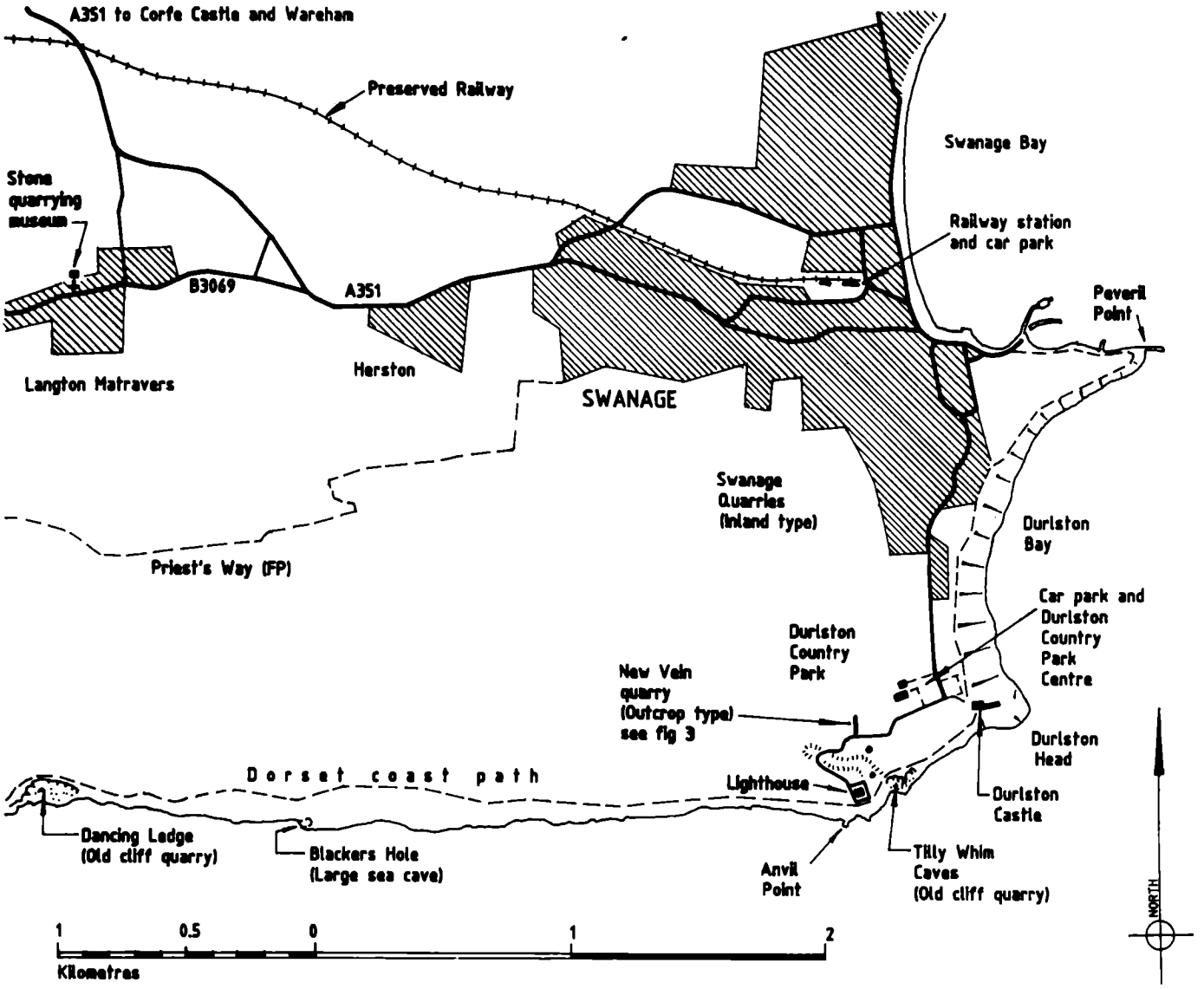


Fig. 1 : General area map of Swanage showing locations of the different types of quarry

Their reasons for doing this are to grill the entrance so that the workings may become a roost for bats, and to help to explain to the public why the surrounding area is full of depressions and overgrown spoil tips, by showing them a typical working. They will not however be taken underground and will only be able to view the workings from the grill.

The mine entrance area has been cleared to show the stone slabbed slide with steps to one side down to the entrance. The capstan stones for supporting the winding gear have been recovered so that they can be erected at the head of the slide with a new capstan, thus illustrating how the large blocks of stone were removed.

A suggestion was made to one of the wardens at the Country Park that it would be helpful to have the mine surveyed and photographed, as the results from this would show the public the layout of the workings and what they look like.

Permission was readily given provided adequate insurance could be shown and an indemnity form signed, so on 22nd November 1986 Peter Burgess, Paul Sowan, Nick Catford and Chris Bayley visited the site to survey and photograph the workings. A copy of the survey can be seen in fig. 2.

The survey was carried out using a Suunto Compass read to 0.5 degree and a Suunto Clinometer read to 0.1 degree. Vertical and horizontal distances were measured to 0.1 metre using 'Fibron' tapes. The grade of the survey is BCRA 5D. The original is drawn to a scale of 1:100 and overs an A2 size sheet.

Surveying and photographing the mine was made more enjoyable by the fact that the heavy rain during the week prior to the visit had caused waist deep flooding at the lowest part of the workings(fig 3) and left a layer of glutinous mud over the remainder.

A small extension to the known workings was made by digging into a roof-fall chamber and threading a way through collapsing blocks into one of the most dangerous sections of mine entered anywhere. This unstable area was

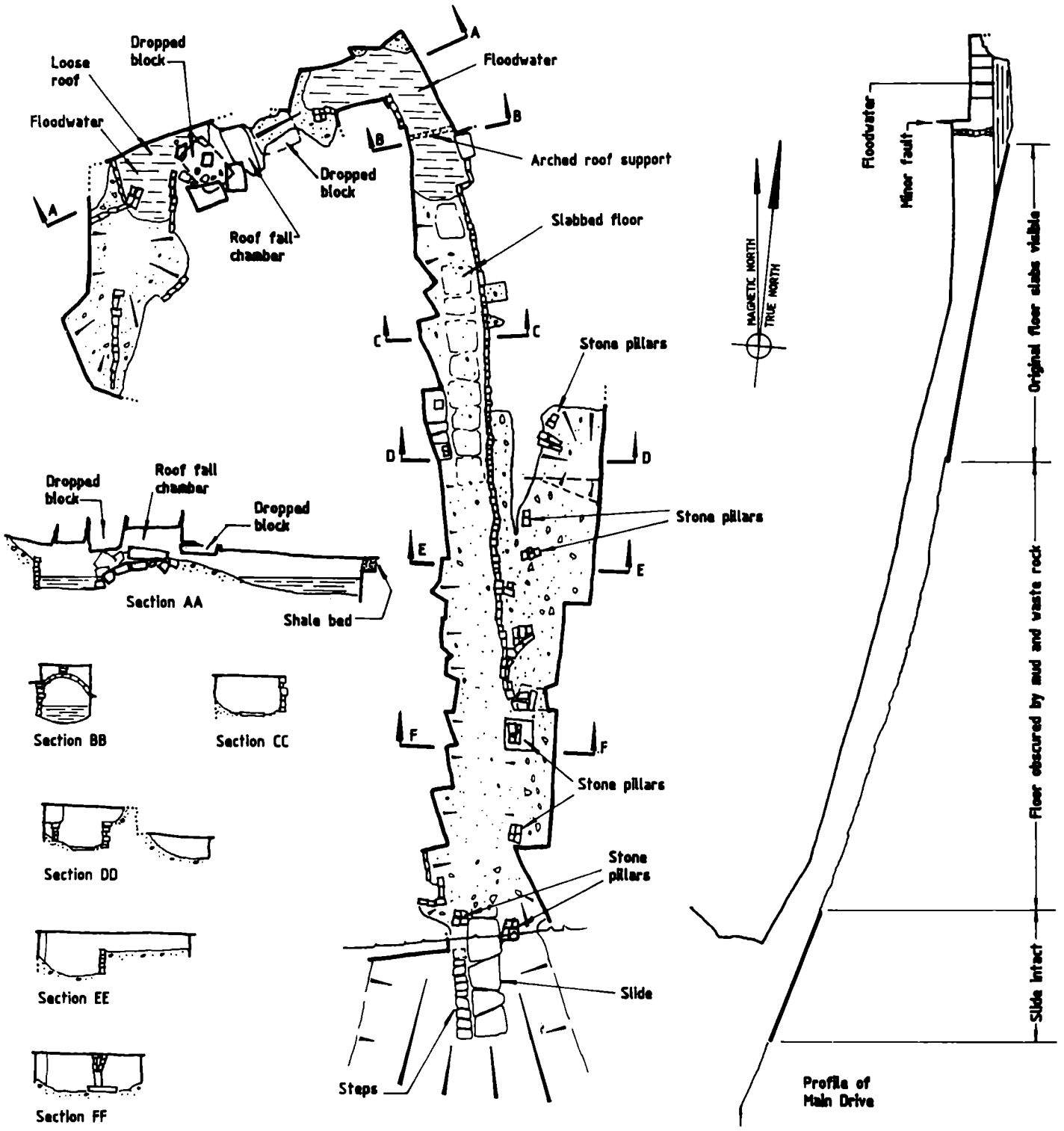


Fig. 3 : New Vein Quarry Durlston Country Park Swanage.

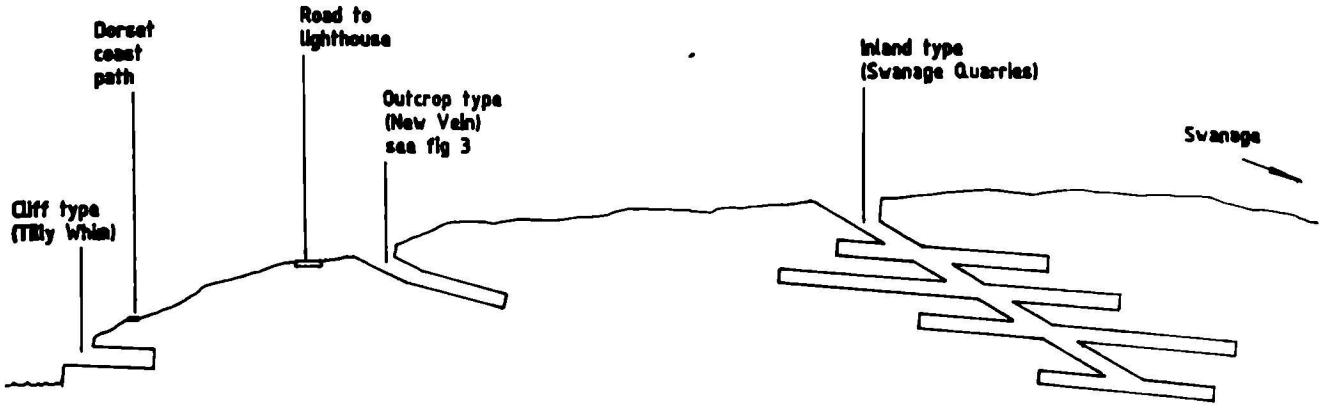


Fig. 2 : Diagramatic representation of the different types of quarry

surveyed very quickly and a hasty but careful retreat made.

During 1987 it is hoped to survey and photograph other workings in the Purbeck area and a full report will apear in a later bulletin.

Copies of the full size (1:100) drawing showing plan, elevations and cross sections can be obtained from Peter Burgess, 5, Oakwood Close, Redhill, Surrey. Price one pound.

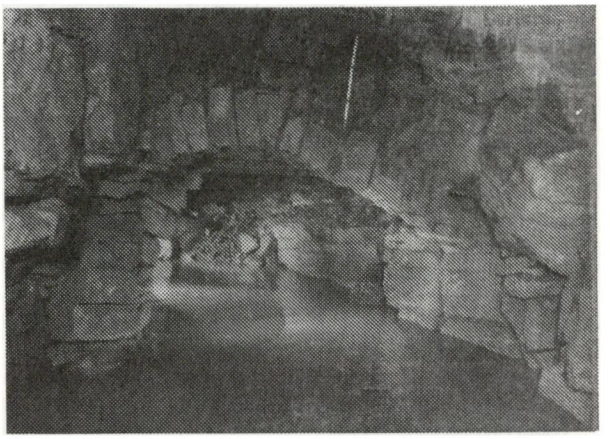


FIG. 3 CURIOUS ARCHED ROOF SUPPORT IN THE LOWEST PART OF THE WORKINGS.

Underground dwellings in France – the case of Chinon

Helen Mulligan

As its title implies, this article takes one particular small town as an illustration of how subterranean mined space is used for domestic purposes today, and attempts to show how this living use may be in the process of change. This will firstly be set in its historical context, the evolution of cave dwelling use in France as a whole. Then concentrating on the Loire valley region, there follows a description of how quarrying techniques,sometimes specific to quite a small locality, have influenced the types of dwelling which have developed. Chinon, in the department of Indre-et-Loire, shows how geographic and cultural factors have brought about the town's present form, based on troglodytism. (fig 1).

THE EVOLUTION OF CAVE-DWELLING USE IN FRANCE

Talk of cave dwellings as being the very oldest form of human habitat is, by now, somewhat clichéd. In fact, it does not give a very accurate picture of the origins of architecture. Natural rock-shelters were only one alternative among many for Early Man to protect himself against the elements – simple windbreaks could be constructed from branches, leaves, bone and hide. Perhaps the earliest artificial shelter, around 2 million years old, was a windbreak constructed of laval blocks and found at an open lakeside site at Olduvai gorge in East Africa (1). Two factors may have discouraged the use of natural caves by early man. One was the fact that caves provided an attractive lair for many species, some of them larger and fiercer than our own ancestors. Mastery of fire and the development of skill in handling and

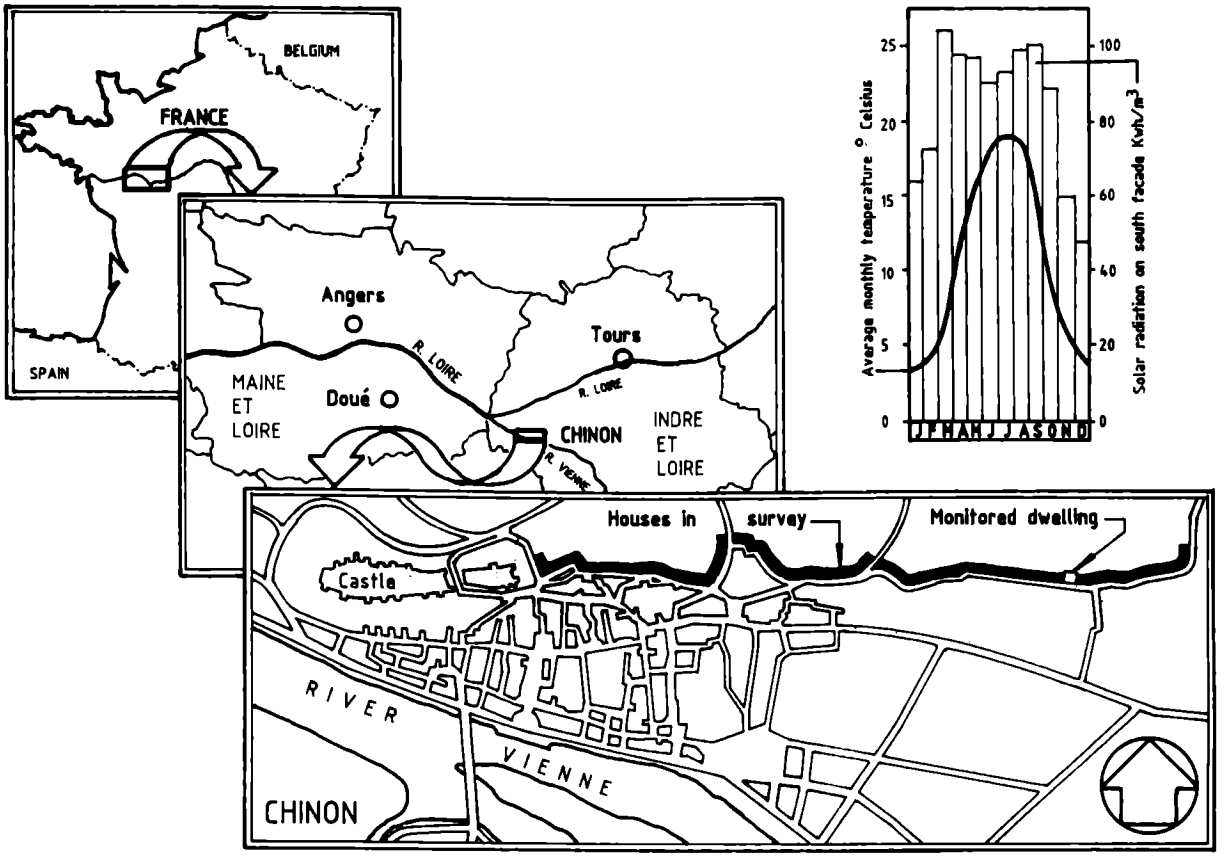


Fig 1. Location of Chinon and regional climatic data

refinement of weapons was necessary to give man the upper hand. The second problem was that caves are fixed elements, useful as a permanent base but less convenient in a situation where food resources had to be pursued over a large area. A light windbreak could be transported from place to place, or simply abandoned and quickly replaced with materials to hand in the new encampment, whilst a cave could not.

Very early use of caves does seem to be associated with climatic changes which brought extremely cold conditions to what are today temperate zones. This may be associated with increased game supply – wild cattle, horses and deer becoming more numerous, enabling bands of human predators to operate from more permanent homes. But it seems that the thermal properties of caves as protection from sub-zero weather were appreciated as far back as the mid-Pleistocene epoch, before the emergence of Modern Man, for example of *homo erectus* colony at Choukoutien caves near Peking (2).

France is exceptionally rich in cave sites which have been fully investigated, and have contributed greatly to our knowledge of prehistoric archaeology. The earliest cave site in Europe, Le Vallonet near the Italian border, has been dated to at least 700,000 years ago. Another site, at Le Lazaret in south western France, around 500,000 years later in date, is especially interesting in showing traces of adaptation by its inhabitants: low rubble walls deflect winds from the cave mouth and divide up its interior space. There are also post holes, indicating the presence of timber frames to support screens of wattle or hide (3). So by the time that Neanderthal man made his appearance, not only were natural caves in use as homes, but also the process of modification to suit human needs had begun.

A sucession of sites in the Dordogne region of south western France are synonymous with the finest achievements of prehistoric cultural development. Cave art, associated with ritual and magic, depicting food on the hoof and hunting scenes, is found deep within the cave systems, which have been tunnelled through this limestone region by subterranean watercourses. Only the cave mouths were used as living spaces: light, well ventilated, where smoke from cooking fires could find its way out. Simple rock overhangs served just as well – subsequent elaboration tended to take the form of huts and cottages built beneath these, particularly where the hardness of rock made extension by excavation difficult with tools available before the use of iron.

THE BEGINNINGS OF CAVE EXCAVATION

Artifically cut caves have a number of advantages over naturally occurring ones. Firstly, a freer choice of site, constrained only by the presence of suitable rock, the possibility of creating space to the dimensions actually needed for a home – rather than making do with what is available. Again this is constrained by the structural competency (strength) of the rock. Thirdly, the opportunity of avoiding fissures and swallow-holes in the rock. With the exception of laval tubes caused by hot gases trapped within volcanic rocks such as basalt, natural caves are solution cavities caused by running water. Even if well above present-day water tables, they are still a

natural route for percolating surface water: a well sited artifically cut cave will be drier and healthier.

Any attempt at a history of excavated dwellings comes up against the problem of dating, which is often impossible due to continued modification of the space over centuries of use. In some cases, it is impossible to tell whether a flint or a metal pick was used for the original excavation, since flaking of the rock has obscured any tell-tale signs. Some long-established cave communities have re-dug caves back into the hillside as collapses occur on the outer face of the cliff, thus obliterating the first excavation, or primeval cave.

Perhaps the earliest artificial cave site is that at Gezer in Palestine, where enlargement of natural caves by excavation, and subsequent excavation of entire dwellings, has been dated to 3,000 BC or a little earlier. (4)In France, evidence of rock-cut dwellings extends from Roman times; in the Medieval period, they became widespread. One factor of importance in the continuing use of cave dwellings is a climatic, related to the comparative stability of temperatures within the cave. This will be explored in greater detail in a subsequent section. Another is historical influences, such as the need for defence in troubled times. Julius Caesar reports that the Gauls in his day resorted to underground refuges when attacked, and this use of souterrains and inaccessible cliff hidey-holes continued under the 9th century Norman invasions in Northern France and the turbulent period of the 100 years war in the SW (5)Hundreds of such refuges are known to exist, but they have little direct relation to permanently inhabited homes, which need spacious, convenient rooms and ready access to the outside world. Cave houses are no more inconspicuous than huts of wattle and daub.

A better explanation is given by lack of alternative building materials available to the medieval peasantry. Although vast tracts of land were covered in forest, these were under seigneurial control – so the cutting of timber for construction was punishable, at least, by a heavy fine. (6)Stone masonry was equally beyond the villein's pocket, so where possible he relied upon his own skills in excavation of a cave-house.

Soft but cohesive rocks were naturally favoured. The distribution of cave dwellings in France is closely related to geology. They are found in volcanic tuffs of the Massif Central, but otherwise in recent limestones similar to our chalk deposits. In the N, the valley of the Seine and Vendôme region, these chalks were interspersed with flinty strata. In the southern cave dwelling areas of Provence, the limestones are harder and more distinctly stratified. Between these, the region of the Loire valley, from the area around Tours down almost to Angers, is today perhaps the most important area of cave dwelling in the country. Here, the limestone has been quarried as a building stone for many centuries, and this quarrying activity has left its mark on the form of dwellings in the region.

QUARRYING IN ANJOU/TOURAINE

1. TUFFEAU

The main features of this gently rolling landscape are composed of sedimentary rocks laid down in the Cretaceous period. There are bands of grittier, fossil bearing rocks in certain localities, but the principal component of these strata is a soft, homogeneous limestone known as TUFFEAU. A pleasant creamy white colour and easily worked, this has been the traditional material for masonry in the construction of farmhouses, civic buildings and the grand chateaux of the mid-Loire valley.

The special characteristics of this stone have called for the development of quarrying techniques directly related to those used for the excavation of cave dwellings. Tuffeau must be mined from underground galleries, not cut from an open quarry face. This is because the porous stone is especially vulnerable to frost attack when freshly cut, due to the high proportion of water contained in the freestone. Blocks must be stacked under cover, to permit evaporation of excess "quarry sap" and the formation of a calcined layer on their surface before exposure to the weather.

Today, only one quarry, which has been extensively mechanised, is still continuously active. During the building boom of the mid 19th century, however, quarries were opened up wherever a sufficiently thick layer of stone could be exploited and transport assured; in 1889, there were 25 in operation. (7)The galleries of one quarry at Montsoreau, begun in 1847, reached a length of 12 km and employed 300 full time quarrymen. Besides these, many farm workers put in evening shifts in the quarries, or mined stone for their own use on a small scale.

Commercial operation began first in galleries opening near the foot of river-cliffs, where the dressed blocks could be easily transported by barge to the growing towns. Later, situations a little further above the water table came to be favoured, since here the stone was found to be of better quality. The layer of suitable stone varies from 3 to 30 metres in depth; galleries were normally 3 m in height, so in some locations up to 4 galleries could be superimposed on one another. The lowest was cut first, and back filled with debris to allow the upper level to be conveniently worked. Galleries were around 4 m in width and interconnected by cross-galleries (pillar and stall mining) to give a "chequerboard" plan of excavation. In this way, 80% of available stone could be extracted, leaving pillars 4m square to support the roof. This orthogonal layout was kept to as far as possible, to facilitate the cutting of standardized blocks with minimum wastage. Occasionally, however, a "knot" of flinty conglomerate would be encountered, which had to be by-passed.

A very detailed account of quarrying procedure has been given by Fraysse, (8) and supplemented by Charneau and Trebbi. (9)In essence, this consisted of driving the gallery further and further into the hillside by splitting

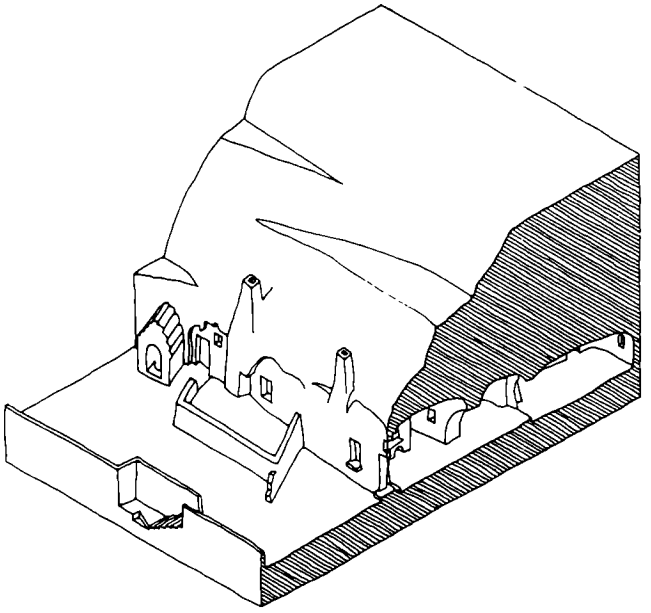


Fig 2. Cut-away of a typical cliff-dwelling in Chinon

a succession of slabs away from the working face. This would be 3m high by 2m broad by about 0.3m deep; each required 10 man hours of labour to cut out with blows of a skillfully wielded pick. A further day would be taken in levering the slab out and cutting it into blocks of various sizes demanded by the building trade. The most common dimensions were the DOUELLE (660 X 330 X 250mm) and the BARRAUD (660 X 330 X 330mm). A score was kept on the number of blocks extracted by marking a tally of barrowloads - dot for douelles, vertical stroke for barrauds - in lampblack at the entrance to the mine. Examples can still be seen, for several of the large quarries have been kept open for use as mushroom farms.

Abandoned quarries could be converted into dwellings by the construction of a facade with doors and windows, insertion of a chimney-piece or stove, and walling off unwanted galleries to the rear. Cave dwellings in favoured location half-way up cliffs of tuffeau often show this characteristic rectangular section, with near-horizontal ceiling (fig 2). The dissemination of quarrying skills through the community meant that purpose-made cave homes could give their owners a double benefit: extracted blocks could be sold, or used for walls and outbuildings.

2. FALUN

An interesting variant on these cliff-houses is encountered in the region of Doué-la-Fontaine, to the S of Saumur in Anjou. Here, underground houses frequently consist of cave-rooms opening laterally from a sunken courtyard: an arrangement also found in China, Tunisia and Spain, but in France confined to this vicinity (Fig 3). The development of this dwelling type can be attributed in part to the landscape – few steeply sloping sites for cliff-dwellings are available in the locality. However, it is not uncommon to see horse-shoe shaped groups of "cave-dwellings" elsewhere in the region, where an entrance courtyard has been half sunk into the hillside to give a greater height of facade for the caves. A courtyard of this type can be entered from ground level on one side, whereas in the typical dwellings of Doué, the pit is 5 or more metres below ground level on all 4 sides, and must be accessed by a steeply-graded ramp.(10)

1. Street
2. Ramp
3. Courtyard
4. Cellar
5. Living room
6. Chimney
7. Stores
8. Well
9. Crops

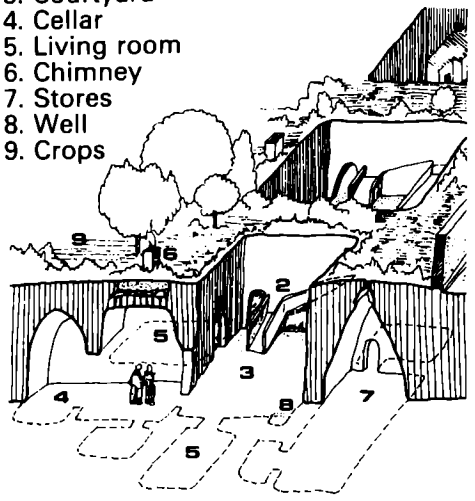
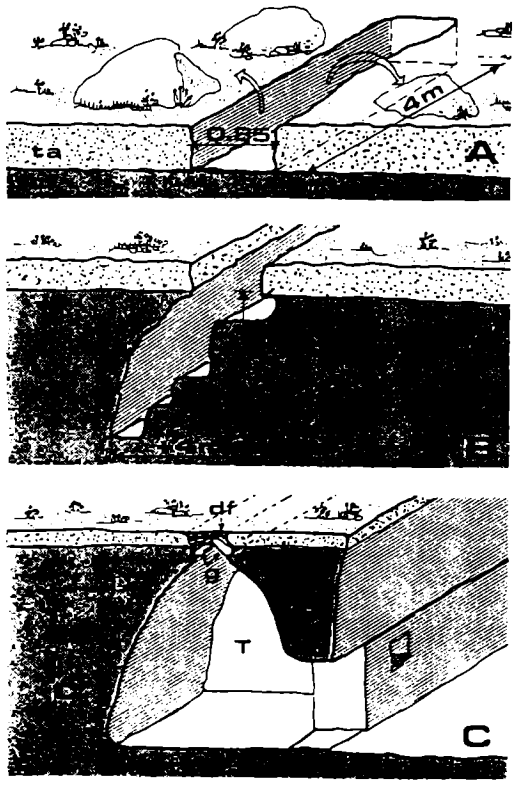


Fig 3. Cut-away view of Doué pit dwelling (adapted from references 9 and 10

Its special features can be traced to local quarrying practice. The stone exploited hearabouts is known as FALUN or GRISON; a sandier material than tuffeau, darker in colour and more clearly stratified, it has been in the past similarly in demand for construction. Deposits are however less extensive, and mining of the stone was for a long time carried out in piecemeal fashion. The method used has many similarities with medieval techniques for the extraction of mineral ores: From a narrow surface trench, stepwise excavation of the "bank" on each side yielded an underground gallery which is bottle shaped in section, and 8m or more in depth (fig 4). The "heads" in either end of the gallery may also be undercut, but all stone was extracted via the original 8m long trench. When the mine had been developed to its furthest extent, the trench was capped with thin slabs and turfed over.

In this way, not only could quarrying proceed under shelter, but agricultural land above need not be sacrificed. On the other hand, these galleries had no convenient entrance, or access to light or air, to permit their re-use as dwellings (some did, however, provide meeting places for semi-secret guilds).

In the late 19th century, it seems that the change in quarrying techniques permitted the opening-out of these underground spaces. Open-pit extraction became viable: perhaps the demand for building stone overrode the need to keep agricultural land intact; or perhaps it was realised for the first time that falun, unlike tuffeau, does not suffer from immediate



g – capping slabs
t – 'head'
c – 'bank'
ta – topsoil
cf – falun
df – backfill

Fig 4 Mining of falun

exposure to the open air. Little research into the development is available, but it seems from the boldly-carved figures on their vertical faces that most of the large open-cast quarries in Doué date from the late 1850's onwards.

Some at least of these pits seem to have been planned as house courtyards from the outset. They are conveniently sized, about 20 – 25m square, and cleverly placed in relation to the older, slab capped galleries so that these could be adapted as rooms opening onto the court. In other cases, new horizontal galleries were cut. These still show a tried-and-trusted section of pointed or ogival arch, but are much lower than the earlier galleries which must often be converted to domestic use by the insertion of suspended floors.

Evolution is continuing: in some cases, courtyards have been subdivided when the inheritance of a "pit house" has been split between several children. A row of such houses in Doué itself has recently been reconnected up to create a communiuty centre and exhibition space, a reminder to the townspeople of the traditional skills which have played such a large part in the formation of their environment.

CHINON

Many sites in the Anjou – Touraine area which assumed importance as religious or military centres in early medieval times are very attractive locations for cave dwellers (fig 4)(11). They are founded on well-oriented escarpments of easily-quarried rock, near watercourses or established routes. Of this, Chinon is a good example; an illustration of how these factors – geology, history and climate – come together to shape a community founded on troglodytism.

The town, now with about 7,000 inhabitants, is situated on the River Vienne, about 8 miles [12.8km] from its confluence with the Loire. It thus commands one of the highest crossing points on the river, where it is divided by a small island. A bridge has now replaced this ford: it is nonetheless still dominated by the now ruined castle sited on the precipitous western end of an escarpment which runs E – W for over a mile. Along the south-facing cliff are ranged cave dwellings from the castle to the eastern outskirts of the town.

It is here that the first known settlement was established – although prehistoric implements have been found. Two Roman villas were sited in the valley to the east, and stone for building them may have been quarried from this cliff – so artificial caves may already have existed by the time that followers of the saintly Bishop Martin of Tours arrived to establish a monastic community in the 5th century. In particular, we know of one recluse, named John, who was consulted here by Queen Radegonde, who had separated from her husband after he had had her brother put to death, and wished to establish a religious community at Poitiers as a counterblast to her husband's worldly court. (12)She was later canonized and a chapel to her memory established here in the 11th century. This was restored in the 18th century, but the nave which was built against the rock-face is now roofless. The N side of the chapel, however, is entirely rock-cut, and is thought to have constituted the hermit John's original cell, with his oratory alongside.

Later development took place to the W, between the slope and the river. The escarpment was fortified in the 10th century to repel Norse attacks, later becoming one of the favourite citadels of Henry of Anjou. Henry became Henry II of England, and fortified that part of the castle known as the Fort St. George. Here he died in 1189, to be succeeded by his sons Richard the Lionheart and then John. This strong identification with the early Plantagenets is shown by the wall painting within St. Radegonde's chapel, which is believed to show King John hunting with his wife and courtiers, John's mother, Eleanor of Aquitaine, is also shown: at the end of her life she retired to the nearby monastery of Fontevrault where the dynastic tombs are to be seen. In 1205 John lost Chinon to Philip Auguste of France after an eight months' seige. The fortification continued, with Chinon as a keypoint in the battle for supremacy in western France between the houses of Plantagenet and Valois. (13)Enormous quantities of stone were extracted from the hillside for the construction of the chateau and growing town. A happy use was discovered in the 13th century for the miles of quarried galleries: wines stored in caves mature to perfection in the stable temperatures.

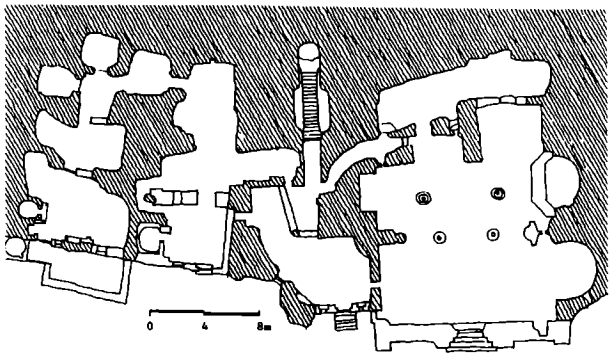


Fig 5 Plan of troglodytic ensemble at Ste. Radegonde, Chinon: chapel (right); oratory and steps down to sacred well (centre); Musée (left).

Today, wine-caves and depots occupy the lower portions of the cliff, while cave dwellings are concentrated towards the summit. Here, the rock changes visibly from the creamy-white tuffeau to another stone which the troglodytes have found even more suitable for their dwellings. This is knows as MILLARGE, a grittier, yellow band of limestone which although slightly harder to cut than tuffeau is less porous and more frost-resistant, and thus less prone to unexpected collapse. It is also in demand for providing a water-resistant plinth to walls.

No two cave dwellings are exactly the same, most are based on a module which has been modified or extended over the course of time. One cave is beautifully kept by our colleagues Prof. R Mauny and Mme. D. Kleinmann as a museum of 'Arts et traditions populaires'. This dwelling adjoins John the Hermit's oratory and has perhaps been inhabited since the 6th century, but in the main exhibits medieval features (fig 5). There is a well to one side of the entrance door, which gives directly onto the main room. This has a small barred window and a chimney breast on the outside wall. A bread oven is let into the thickness of the rock on one side, and alcoves have been excavated to give an extra kitchen corner, and a bedroom placed alongside the living room so that it can have an external window. The texture of pick-marks can still be seen on the walls, which are whitewashed to improve their reflectivity. The whole very simple house is within the rock face. There are no mains services like water and drainage.

Another house, a little way along the cliff, is a good example of how a new bathroom can be incorporated into the old plan. The cave is on two stories, linked by a rock-cut stair, so that the roof of the bathroom which is built out from the cliff-face provides a terrace for the upper living-room without obscuring the light to that below (fig 6).

In other cases a substantial part of the house is located in a constructed building placed against the cliff; these take two forms – those with a lean-to roof and eaves parallel to the rock-face; and those with a gable against the rock and eaves at right angles to it.

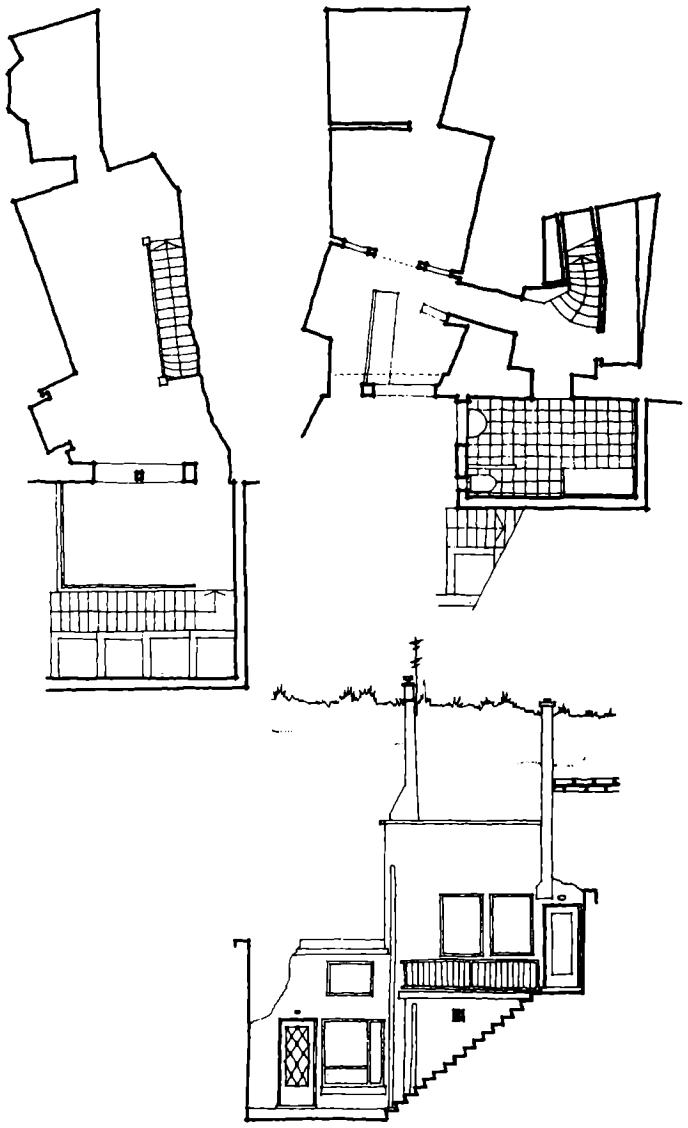
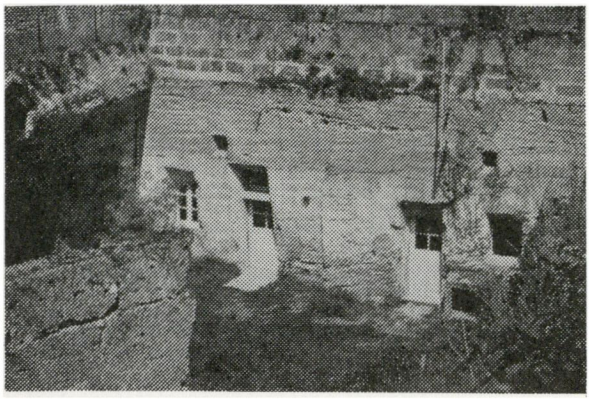


Fig 6 Modernised cave dwellings with bathroom extensions: elevation, ground floor and first floor plans.

An example of the first is the house which at first site appears like a standard French speculative builder's villa, complete with dormer windows, patio doors and so on. But it's only half a villa – the other half is within the rock, including the staircase. These rooms must now be artificially lit, and assistance is often needed with ventilation (fig 7).

In the second type, the house often projects alongside the cave entrance. In this example (fig 8), the gable is wide enough to cover the doors to several of the family's caves. In fact, the visible "house" is only half of the floor area of the whole establishment.

Very often, these cave rooms are used as games rooms, playrooms, or explicitly "just for parties". They may be relegated to use as stores. never theless, owners of cave-houses are proud of the "original" part of their homes and often take great pains to integrate them visually with the more conventional portions.



COURTYARD HOUSE AT DOUÉ

The flexibility in use of caves is appreciated, the possibilities they offer for personalisation at the touch of a chisel. Extensions can be made in stone, timber, or faced in terracotta without losing the caves charming integration into its surroundings.

There is another sense in which the cave is in tune with its environment. The great mass of rock surrounding the cave acts as a buffer from extremes of winter cold and summer heat. Fig 9 shows temperatures in late winter recorded at the Museum cave at Chinon. Variation from day to night is ironed out by the fluctuation of

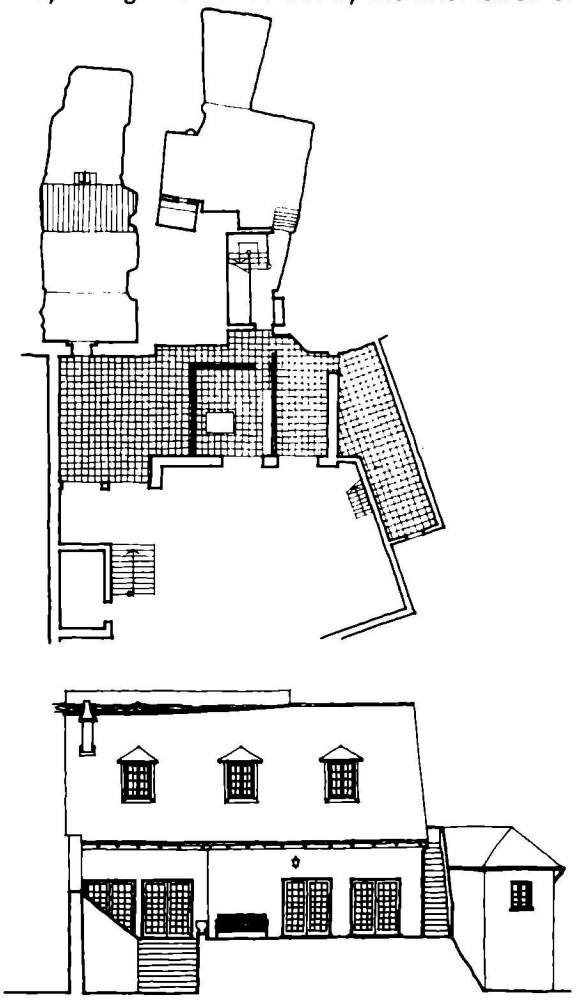


Fig 7 Cave dwelling extension parallel to cliff face: plan (top) and elevation.

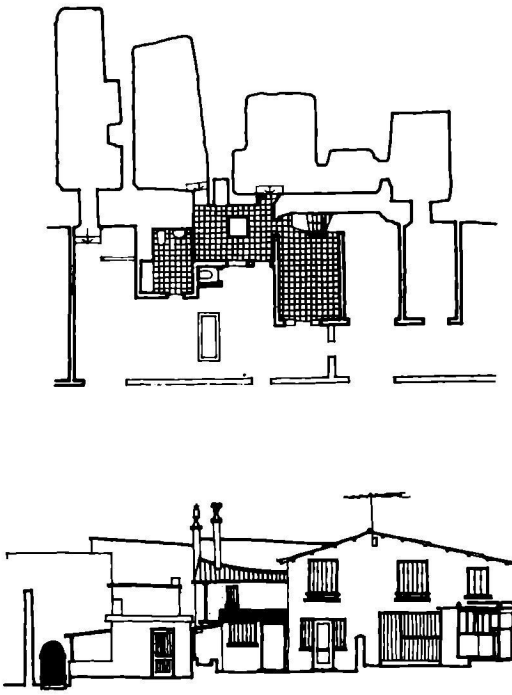


Fig 8 Cave dwelling extension perpendicular to cliff face: plan and elevation.

only one or two degrees inside. Touraine has a mild climate – warm in summer, above freezing for most of the winter, with considerable rainfall in every month. Average air temperature is between 11 and 12 degrees. The cave temperature stays close to this average throughout the year: in effect the rock is a giant solar collector storing summer heat to counteract winter cold. By computer simulation based on observed recordings, (fig 10), it can be estimated that internal temperatures range from 7 degrees Centigrade in the very coldest spells to 16 degrees in late summer. (14)This means that fuel bills are kept down – although a little background heating is required right through the year, the total will only be approximately two-thirds of what might be expected for an equivalent building of traditional construction.

Ventilation must be taken care of in order to minimise condensation. This can give rise to dampness, especially in early summer when warm, moist air from outside is liable to produce beads of moisture on cool cave walls. "Lucarne" fanlights or high-level windows are a frequently encountered feature of cave-houses. Occasionally, these mark the presence of a sleeping gallery or storage loft; they are however, of great value in a single-storey cave, in admitting shafts of sunlight deep into the rear of the cave, and also to encourage a flow of air by convection due to pressure difference between low-level and high-level openings. Chimneys to open fires functioned even more efficiently in this way, but sadly their use is becoming less common.

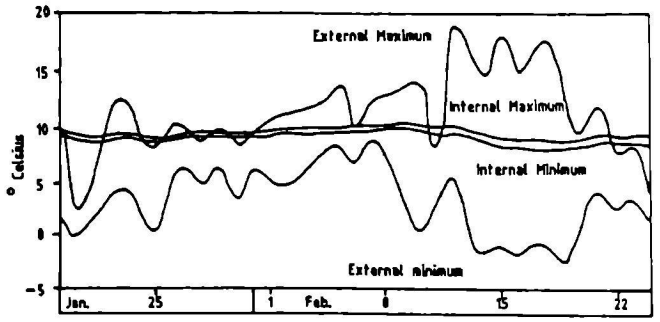
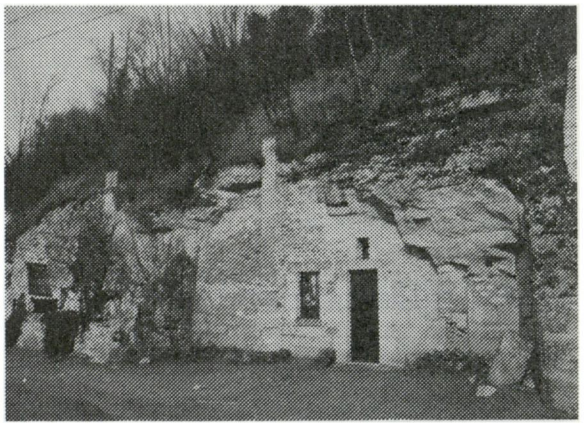


Fig 9 Temperatures recorded inside and outside cave-dwelling, Chinon.

The installation of a new heating system, and other measures taken to make cave rooms a more attractive setting for modern life – such as weather-stripping to combat draughts and lining of walls to produce smooth plastered surfaces – can enhance the energy efficient properties inherent in these homes. On the other hand, trends such as the increasing use of cave dwellings for weekend and holiday occupation only, may reduce their potential for energy saving and bring problems like an increased risk of condensation dampness made worse by lack of continual air-flow.

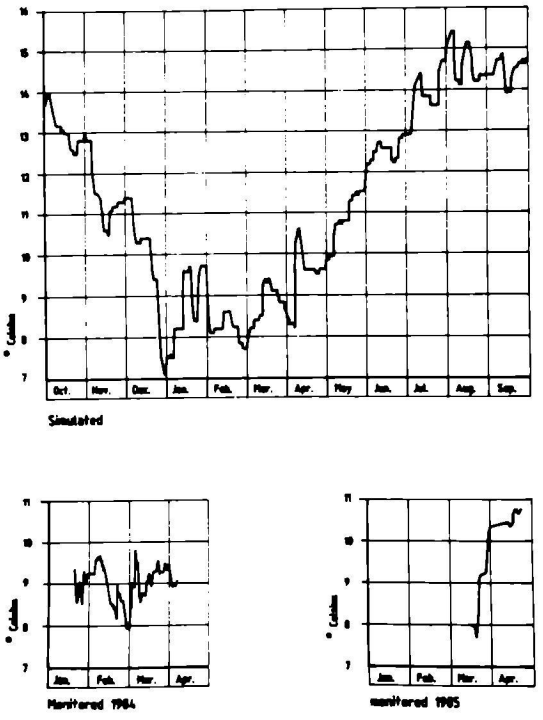
This certainly does not mean that rock-cut rooms are not suited to contemporary usage; simply that careful consideration must be given to several options, taking into account the occupants' needs, and lifestyle, when "updating". Many highly desirable residences can be seen in Chinon and other towns and villages of the region, which have resulted from sympathetic upgrading of troglodytic houses perhaps rescued from abandonment or use as lumber rooms or stores. Troglodytism is still a living tradition in France – at the last estimate, 25,000 people were housed in rock-cut dwellings. (15)With increasing desire for high standards of comfort coupled with value for money in the home, their energy-conserving properties will be as well-appreciated in future as they have been in the past.



DWELLINGS AT STE. RADEGONDE ESCARPMENT AT CHINON.

ACKNOWLEDGEMENT

Detailed study of cave dwellings in Chinon, and especially the Ste. Radegonde chapel and museum would not have been possible without the active cooperation of Prof. Raymond Mauny and Mme. Dorothée Kleinmann; thanks are extended for their enthusiastic support.



Prediction of year round-temperatures within cave dwelling, produced by microcomputer simulation, compared with actual temperatures recorded in Jan-Apr 1984 and 1985.

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Three Souterrains in the Cork/ Waterford region of Ireland

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A souterrain is an underground gallery or chamber. These are commonly found in Ireland and are usually discovered accidentally, i.e. during ploughing, quarrying etc. Very few have been found during routine excavation therefore an accurate estimate of their number is not possible. The method of construction of the souterrain varies. Some are tunnelled in clay or rock; others are built of stone after the souterrain has been cut into the clay.

In an area immediately NW of Youghal(fig. 1) in the border region of Counties Cork and Waterford, there are three souterrains with a similar type of plan and construction – Cornaveigh (1), Ballyknock (2) and Rath (3). These souterrains are within a three mile radius. They belong to a group of souterrains which have at least two chambers or galleries and an L-shaped plan (McCarthy 1983 (4)).

The distinction between a gallery or chamber is one of length. A chamber is shorter with a maximum length of 3.5m and a gallery ranges from 4m to 9m in length.

These souterrains are made from uncut stones and large roughly squared blocks. At Cornaveigh, the stones of the basal layer are approximately 1m in length. The walls of the gallery were constructed on these and were made up of between 5 and 6 courses of stone. At Ballyknock and Rath, there are no obvious courses of stones and the stones are smaller than at Cornaveigh. The passages in the three souterrains are roofed by large lintels; the longest at Ballyknock is 1.78m, at Cornaveigh 1.4m and at Rath 2m.

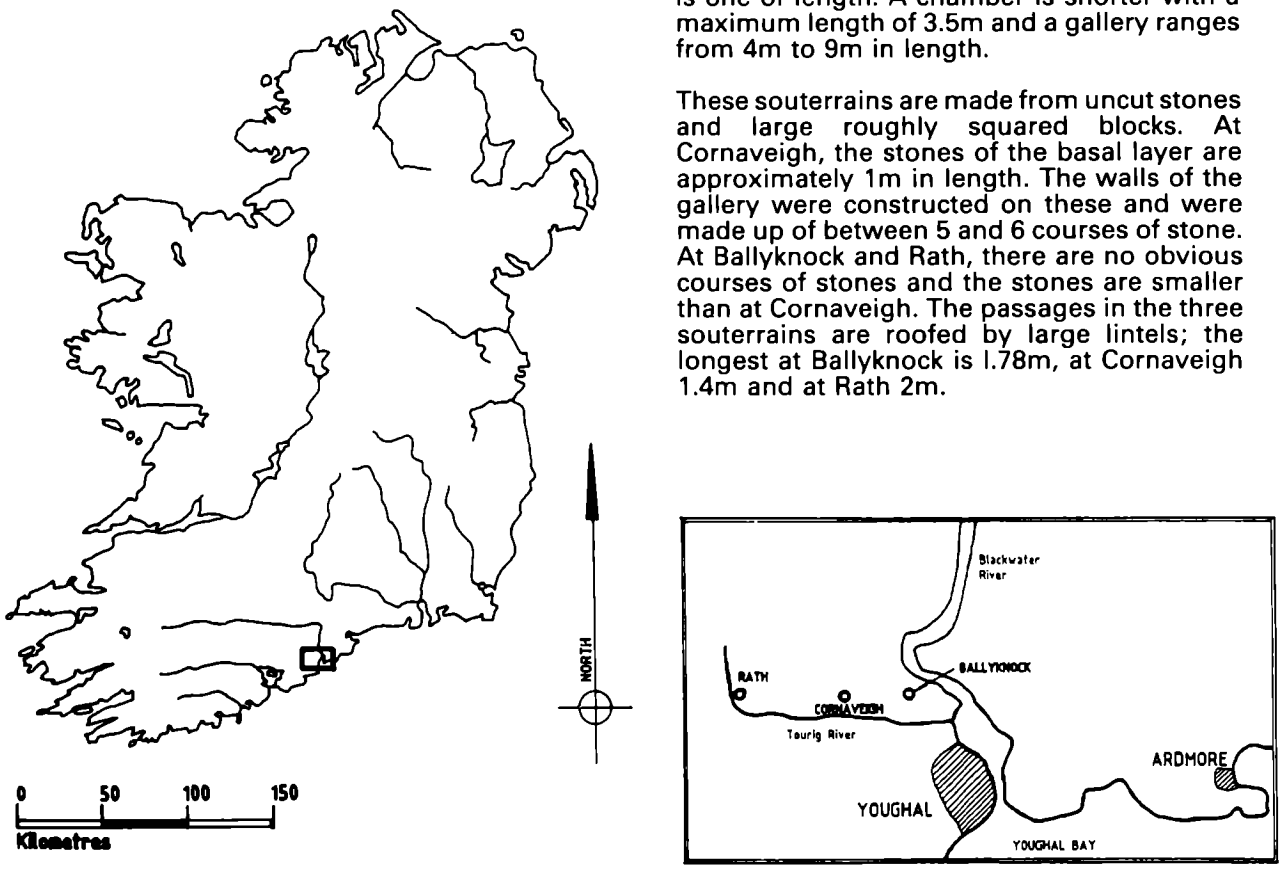


Fig 1 The sites of souterrains at Cornaveigh Ballyknock and Rath

CORNAVEIGH

Discovered in 1985. This souterrain consists of a small entrance chamber, 1m in length, which lies on a NE-SW orientation.(fig. 2) It widens from 67cm at the entrance to 70cm at the junction of the two chambers. This chamber lies at right angles to a gallery, 5m in length. The gallery lies on a NW – SE axis. The gallery narrows from 86cm wide at the entrance to 60cm wide at the end. The floor rises from 84cm at the end of the gallery to 67cm at the point where the collapsed material is present. The rubble then rises to 43cm below the roofing.

There is a well constructed lintelled entrance, 27 cm from the end of the gallery in the SW wall. It measures 66cm in height. It marks the entrance to a creepway which does not appear to continue beyond the facade. The function of the creepway must be entirely speculative since the degree of collapse prevented investigation beyond the entrance. However, we can be fairly certain that the chamber, if there was one, was not stone built. It may have been an entrance or exit. The entrance chamber (the present point of entry) may in fact be a second gallery which extends further north-eastwards.

One fragment of iron slag was found on the floor at the end of the gallery.

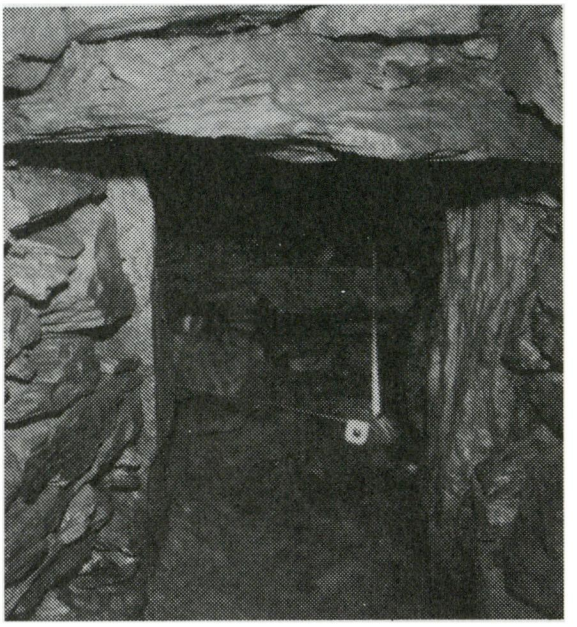
BALLYKNOCK

Discovered in 1983. The souterrain at Ballyknock consists of a gallery 5.5m in length, which narrows from 75cm in width at the present point of entry to 38cm in width at a creephole where it joins a second gallery. This gallery lies on a NE-SW orientation. The height of the gallery,(fig.3 section A-B) inside the areas now covered by collapsed material, is 1.11m. The height of the creephole is 67cm. A second gallery lies at right angles to the first gallery on a N-S axis. This gallery is 3.7m in length and narrows from 50cm in width at the beginning of the gallery to 45cm in the centre. The height at the N end of the gallery is 1.08m and at the centre where the surface of the floor rises slightly to a height of 82cm.(fig. 3 Section C-D) The gallery then widens slightly at the end and the floor is lower at this point. A possible third chamber may lie at a right angle to Gallery 1 and in a north-easterly direction for an unknown distance.Excavation would be required to determine this.

RATH

The earliest reference to the site is in 1848 (5). This souterrain consists of 4 galleries. The entrance is at the S side of a ringfort, beside the bank. Gallery 1 is 4m in length and narrows from 98cm wide at the entrance to 56cm where it joins the second gallery.(fig. 4 Section L-M) This gallery lies on a N-S orientation and is 1.15m in height. The second gallery, 4.72m in length, is 85cm wide and the height is 88cm. At right angles to this gallery lies a third gallery, 4.68m in length in a N-S orientation. This gallery is 93cm in height and 92cm wide. Gallery 4 is 3.85m in length, 1.2m in height and 1m wide.

A doorway (approximately 45cm in width and between 75cm and 106cm in height) joins each gallery to the next. At the N side of the W wall in Gallery 2, collapse in the upper section of the walling shows an construction trench, 40cm from the outer edge of the walling.



BALLYKNOCK - Creepway linking chambers 1 & 2

DISCUSSION

These three souterrains are simple in plan, consisting of between 2 and 4 narrow passages, each at right angles to one another. At Cornaveigh and Ballyknock, they are L-shaped though their full extent is not known.At Rath, there is a likeness, though more elaborate, layout. Their similar method of construction may reflect a particular tribal or family group in that region of Cork/Waterford, whose boundaries are unknown today.

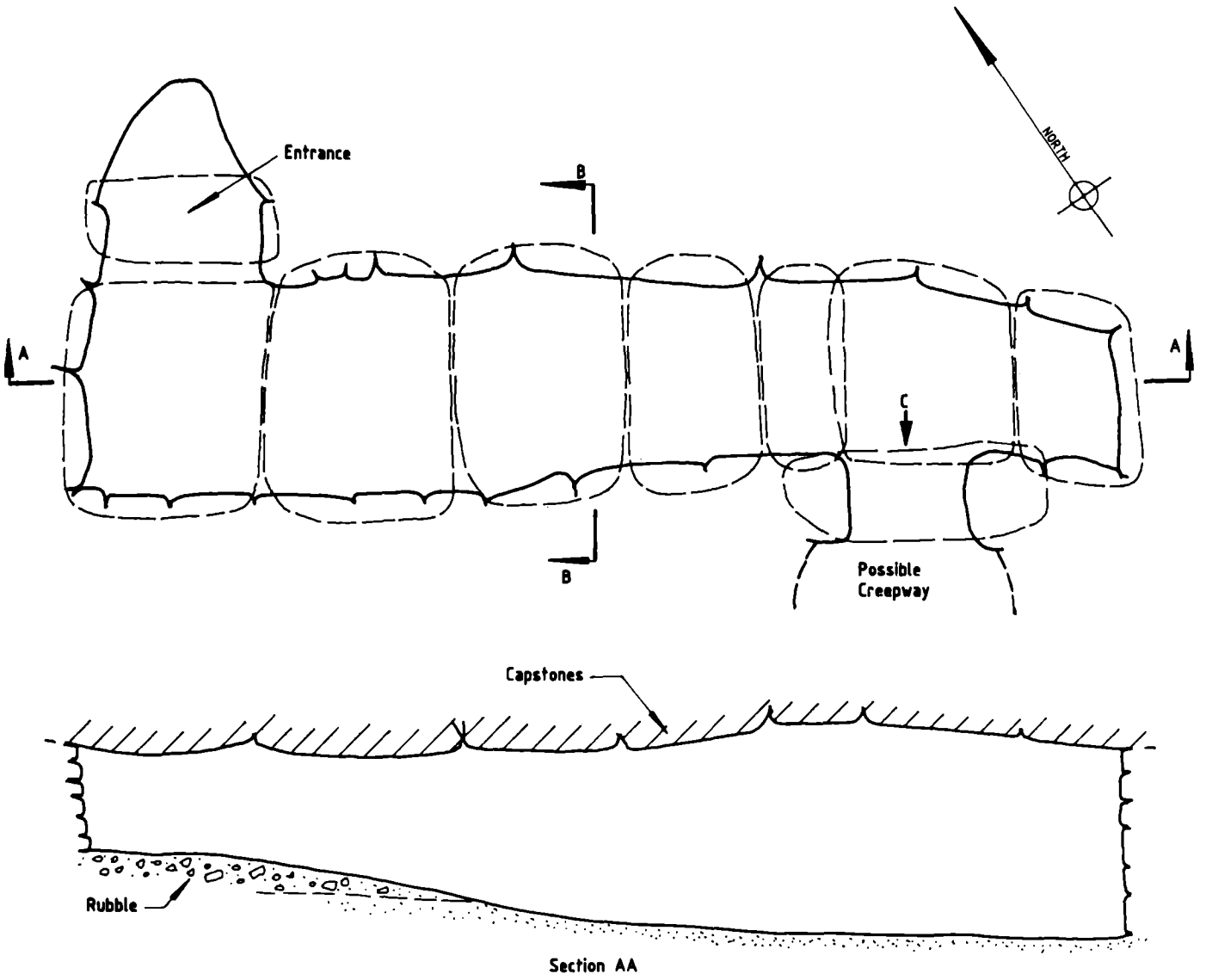
Unfortunately, there are no dates for the souterrains at Cornaveigh, Ballyknock or Rath. It is generally thought that souterrains were constructed in the Early Christian period and may have been used (and/or constructed) in Medieval times.

The majority of Irish souterrains are found in the interior of ringforts (5). Rath is associated with a ringfort and two ringforts are situated near the Cornaveigh souterrain. There are no visible field monuments in the immediate vicinity of Ballyknock. Cornaveigh and Ballyknock may have been directly associated with ringforts which are now destroyed.

It is generally thought that souterrains were used as places of refuge. Ballyknock, Cornaveigh and Rath are situated in commanding positions (The former two overlook a river at altitudes of approx. 200' above O.D. and the latter at 400-500' O.D.). The interior of a ringfort would seem a suitable place to put an underground refuge or storage place. Some souterrains may have been used for storage (grains, dairy products) or hiding valuables, or a combination of these.

Parallels to the Irish souterrain are found in Scotland where they are known as 'earth-houses' and in Cornwall as 'fogous'. In France (mainly in Brittany), similar structures are the 'souterrain-refuges' (6).

Fig. 2 : Cornaveigh souterrain Co. Cork



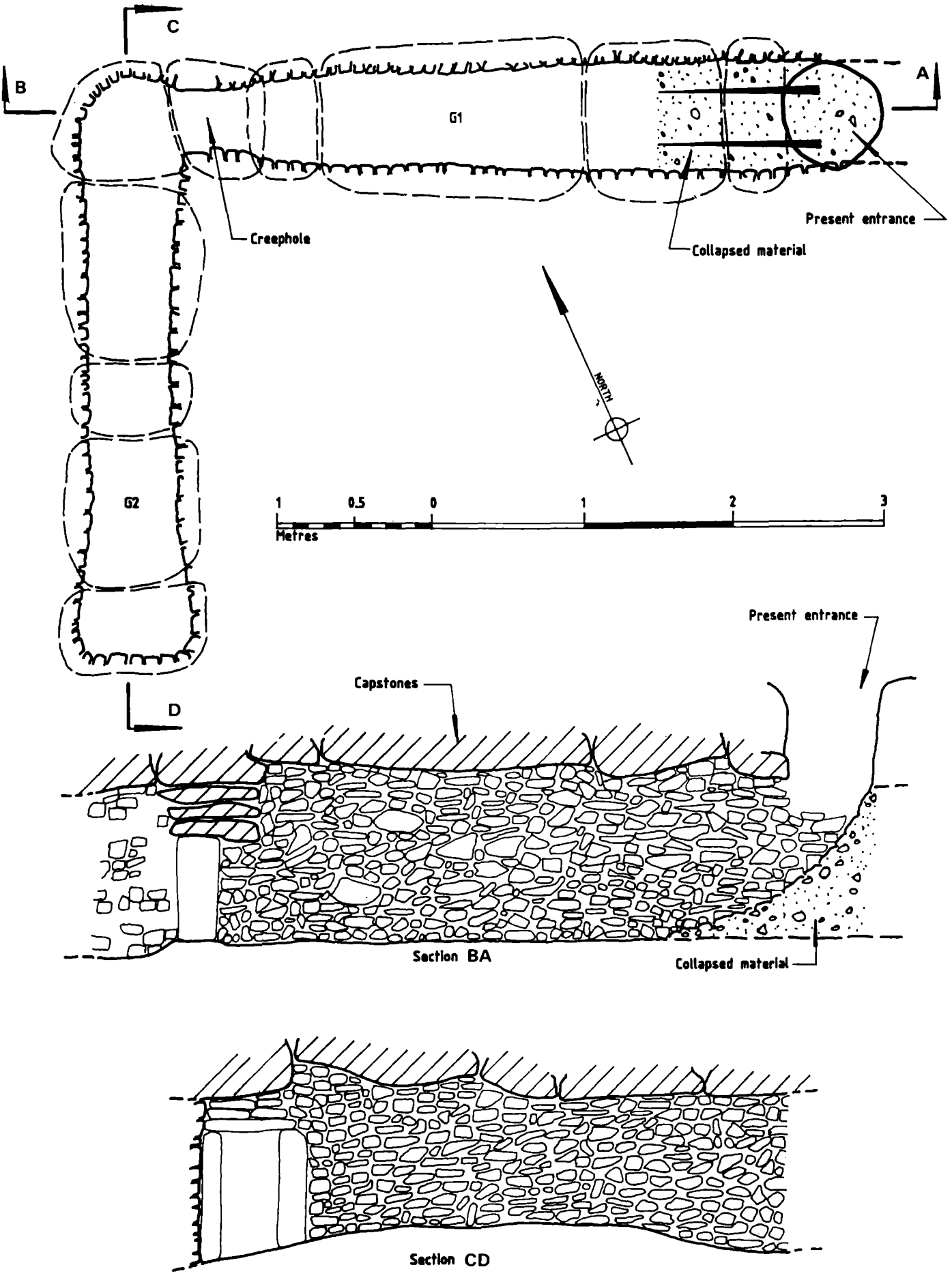


Fig. 3 : Ballyknock souterrain Co. Waterford

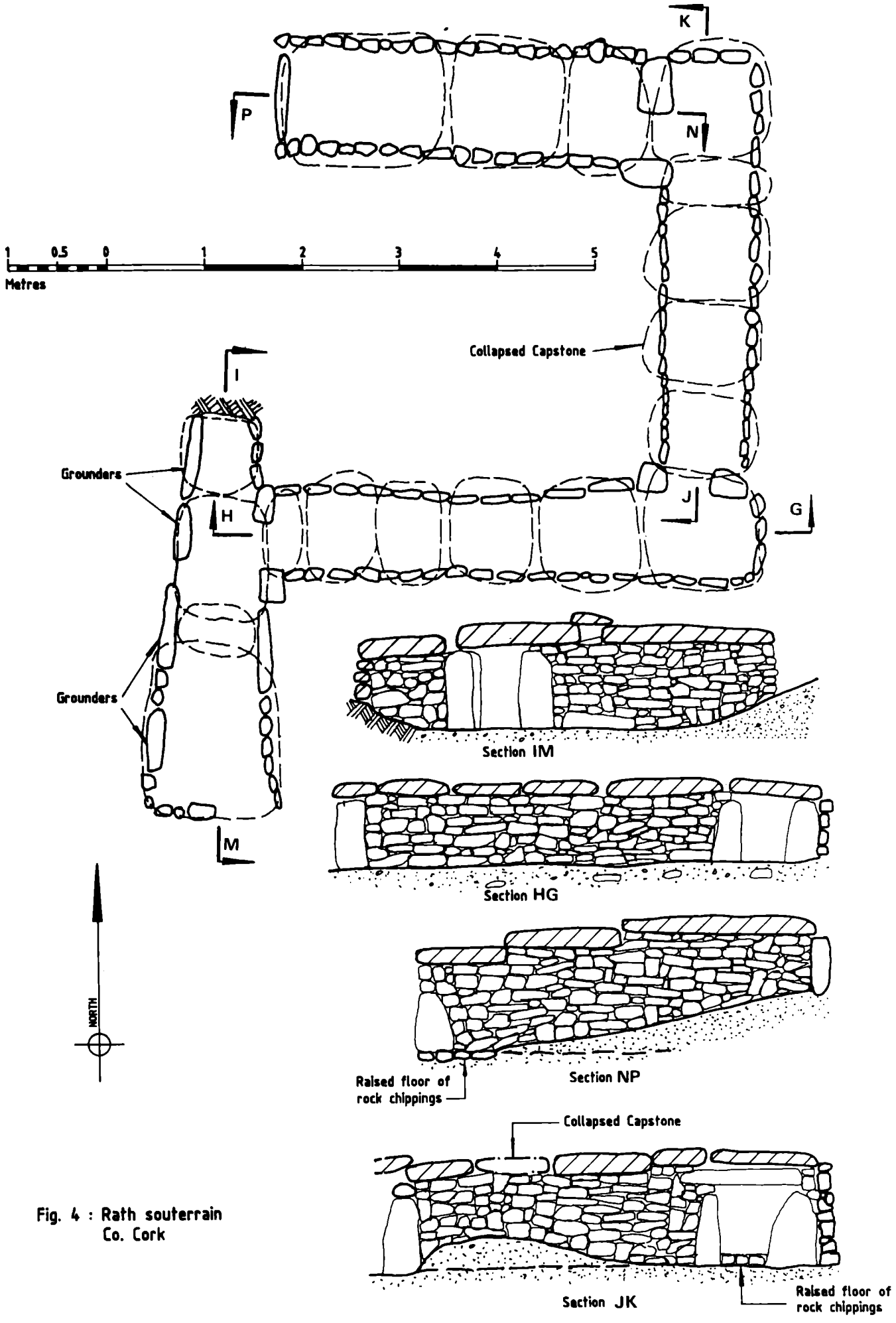


Fig. 4 : Rath souterrain
Co. Cork

NOTES

1. Exact location: O.S. 6" scale sheet No 67, Co. Cork. 28.9cm from W margin, 3.7 cm from N margin. By: Imokilly; Ph: Ardagh; Td. Cornaveigh. NGR: X

2 Exact location: O.S. 6" scale sheet No. 37, Co. Waterford. 25 cm from W margin, 3.6 cm from S margin. By: Coshmore and Coshbridge; Ph: Templemichael; Td. Ballyknock. NGR: X.

3 Exact Location: O.S. 6" scale sheet No. 67, Co. Cork. 1.5cm from N margin, 3.5cm from W margin. By: Imokilly; Ph: Ardagh; Td. Rath. NGR: X.

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A fresh approach to the Margate Grotto

Ruby M. Haslam

The grotto at Margate is an enigma in as much that no one hitherto has been able fully to explain its origin. For over 150 years this most fascinating 'Souterrain' has puzzled and perplexed archaeologists, visitors and holiday-makers alike, but it has defied identification and still remains one of the unsolved mysteries of Kent.

This fresh approach takes a closer look at the ornamentation of the interior of the Grotto, in the hope that the many shell patterns, with their signs, symbols and symmetry will throw some light on the philosophical notions expressed in them. Then perhaps answers will be found to three important questions:

What is the grotto? Why Margate? When was it built?

Situated in the garden of a Georgian house called Rose Lodge, or sometimes Rosannah Lodge, this artificial cave is cut out of chalk and decorated throughout with shell mosaics. The shells are, however, laid out in a very special and curious way. At least 100 symbolic designs have been identified and verified. Unfortunately the shell work is now greyed or blackened mainly because, when the grotto was first opened to the public in 1838, gaslight was put in by the owner. The cement used is similar to the celebrated Roman cement of Dover Castle and the millions of shells are so firmly fixed that they are still held fast, even though the cement, in some cases, barely touches them. Although the cement has in recent times been analysed, there is an unidentifiedingredient which probably makes the cement impervious to water. (The Heskett family, previous owners, maintain that the ingredient was fish oil).

The Victorian naturalist Frank Buckland paid many visits to the Grotto, intending to write a book about it, had not untimely death put an end to his labours. His theory was that the shells were first carefully sorted out into sizes, washed and embedded into the cement while still containing the live molluscs in them, or they would not have remained in the wonderful state of preservation which they were in at the time Mr. Buckland wrote his report. Some of the shells contain fossilised fish, which some people say "proves the antiquity of the Grotto" (sic).

In 1897 Frederick Stanley,a member of the Conchological Society, wrote a report for Mr Goddard who had been the owner of the grotto for several years. In the report he expressed the opinion that most of the shells which form the ornamentation of the Grotto were imported, probably from Shellness in Pegwell Bay "... as they do not appear at any place in the quantity necessary to have enabled the carrying-out of an elaborate and extensive piece of shell mosaic".

Littorin Neritoids are mainly the particular type of shell found, and Mr. Stanley enumerated 28 different varieties. It has been said that some of the shells used are too large to have been found locally: mussels, oysters, whelks and conch are among the shells used and the ground-work consists of millions of yellow periwinkle which in their original state must have produced the effect of brilliant gold. In fact, the Grotto could have been described as the 'Golden Temple'.

That famous Victorian novelist Marie Corelli painted a romantic picture of the Grotto in her book of short stories published in 1888

"...There is something not exactly high-class in the name of Margate, sixpenny teas are suggested, and a vulgar flavour of shrimps floats unbidden in the air.... When a man meets you at the corner of the pier and puts a badly written fly-leaf into your hands with the words 'Go and see the Grotto' upon it, you naturally believe that this is an advertisment for a place built out of oyster-shell where you can have tea and shrimps *ad libitum*, and you immediately set yourself against such allurements, preferring to be in the fresh salt air, and roam at your pleasure by the sea."

"But there is something at Margate besides the air, the sands and the sea; something that calls for recognition from students, antiquarians, lovers of romance and Savants of all classes and nations: something that just because it is at plebeian Margate has escaped the proper notice and admiration it so strongly deserves".

With a lighted taper in the hand of her guide, Marie Corelli described how she followed her down the flight of 9 stone steps "...and in a minute we were in the subterranean Temple, miscalled a Grotto, and which, as my guide lit the gas along it, proved to be one of the most beautiful, fantastic and interesting relics of the ancient days that exists in England or anywhere else". Marie Corelli went on to write "...Utterly unprepared as I was for such a marvel of art and beauty, I said to my guide 'what is the history of this wonderful place?...' and she was told the story of the Grotto's discovery in 1835 by schoolboys from the nearby Dane House School."

The story is told of how the boys from the school dislodged a stone, and became curious when they looked down what they thought was a disused well. Another version of the story is that workmen digging on the site lost a spade down the dome and wanted the lads to retrieve it for them. All accounts seem to agree about what followed: the schoolmaster Mr. James Newlove was called to the scene and he promptly tied a rope around his small son Joshua, and lowered the lad down the well with a candle lantern around his neck. The boy described what he saw as a "kind of Aladdin's cave".

James Newlove's private school stood on the corner of Bath Road and Dane Road, where the Mulberry Tree Inn now stands. Intending to extend his school Mr. Newlove took out a lease on Rose Lodge, but after the discovery of the Grotto decided to buy the place. There was no mention of the Grotto in the deeds. There is an element of mystery surrounding the freeholders of Rose Lodge and the land, and Mr. Newlove negotiated only through their representatives. He raised a mortgage and the purchase of the property was not effected until 3rd August 1837, more than two years after the unsigned lease had been drawn up. The site appears on Edmund's map of Margate published in 1821 as a piece of open meadow or grassland, with one or two farmyards in the neighbourhood.

In December 1829 the piece of land called Luke's Dane Field was purchased by a builder George Bowles, who that same year raised a mortgage on a cottage he had built on the site, Belle Vue Cottage; and then, according to some reports, he left for America. Mrs. Newlove opened a girls' school in the cottage built by Mr. Bowles.

About 10 years after the grotto had been opened to the public, Charles Knight compiled a series of volumes on the history of England, and he had this to say about the Margate Grotto: "...Behind the town (Margate) on the point called the Dane, there is a curious Grotto cut out in the chalk... It long passed for an antique, but it now appears that although the cave was old, the shellwork therein was done by an ingenious artisan of Margate who, some years ago, went to America...". It is said that Mr Knight based his statement on gossip disseminated by a workman named Wales who did some crude shell-work decoration in the entrance passage, in which niches were made to hold candles. Mr Wales had greatly annoyed James Newlove by going about saying that he had made the Grotto.

In 1897 Fanny Schmidt, Mr. Newlove's daughter and the sister of Joshua, the boy who was lowered down on the rope, was interviewed. She was then well on in years. Fanny admitted that her father had taken off the vaulted roof of the chamber which he floored over when he needed more rooms for the school. She said that her father was over 6ft [1.8m tall] and weighed 18 stone [114kg]. He was unable to enter the Grotto until the entrance had been widened "...The boys may have gathered shells, as we had to do some repairs, especially after foolish people had done damage to the Grotto, but we never made the place" the old lady insisted; "We only found it..." Such was the plain straight forward story of one of the Grotto's earliest owners.

The present owners, Andre and Eileen Heigl, bought the Grotto from Mr. and Mrs Heskett. It had been in Mrs Heskett's family for a number of years.

One thing we can be absolutely certain about is that there is no way Mr. Newlove could have constructed the Grotto in secret. When the Duke of Newcastle had a Grotto constructed in the grounds of Oatlands Palace near Weybridge, it cost him £60,000 and the shells were not laid in any definite designs like those in the Margate Grotto. The poet Alexander Pope (1688-1744) spent about the same amount of money on his simple grotto at Twickenham and many of the shells he used were gifts from friends all over the world.

The well known writer H.G. Wells visited the Grotto and believed it dated back some thousands of years BC but archaeologists have not supported this view. Many of the early writers on the Grotto have expressed the opinion that the Grotto is a relic of past civilisations intended as a temple for some form of worship. Many hypotheses have been put forward...a Pagan Temple to the Moon goddess Danu, or to the Earth Mother Ma Rhea; a Solomon's Temple to Ishtar or Ashtarte (the book of

Kings tells us that in his old age Solomon went the way of the Ashtarte). Ishtar's emblem was a turtle, and excavations above bomb damage to the Margate Grotto revealed turtle relics behind the altar. Another theory is that the Grotto was a temple to the Carthaginian goddess of wisdom Tanit, whose emblem was a triangle. Tanit or Thanat was the Carthaginian name for the Roman Mars, and Margate may have originally been Marsgate.

We know that there were ancient temples on the triangular chalk Isle of Thanet, shown on Roman maps as Tenet, a word which means 'doctrine'. For Pope Gregory had told his missionaries not to hesitate to re-consecrate the temples that had fallen into heathen hands, only to destroy the idols in them. It was to Thanet that these missionaries came with Saint Augustine in the year 597 AD soon after Aethelberht, King of Kent, had married Princess Bertha, the catholic daughter of the Frankish King reigning at Paris. It was after Aethelbehrt's baptism that the foundations of Canterbury Cathedral were laid.

It is said that the Franks, a Germanic people, were descendants of the Line of David and were heirs to the throne of Jerusalem. Not far from the grotto is an open space called Zion. A Saltire or Frankish cross is one of the most prominent symbols at the entrance to the Margate Grotto. Another clearly defined symbol is a large letter 'Y', used by the Druids. This symbol is known in heraldry as a Shakefork or Pallium. The Pall was at one time the symbol of an archbishop. Incidentally, the word 'Pal' is the English gypsy word meaning 'brother'.

History records that King Alfred, who was a catholic and attended Mass every day, was also known to have frequented the pagan temples. In his day, the month of February was called Solmonath. It was a time of purification by water and by fire, and cakes were burnt in the temples as a sacrifice. King Alfred went down in history as the 'King who burnt the cakes'. The cakes may have been heart-shaped like those that are popular on the continent today. The heart motif can be seen all along the serpentine passage in the Grotto that has come to be called the 'Hearts Passage'.

In the 1950s some very valuable research was done by Conan and Nellie Shaw. They described the Grotto as a cave of numbers, and set about counting the shells. They came to the conclusion that there was much in the Grotto that was Pythagorean. The triangle of ten dots, said to have been invented by Pythagoras himself, was the sign by which the Pythagoreans entered the Temple. It can be seen quite plainly in the Grotto.

By using a method known as Gematria, that is, changing numbers to letters they found that there were Biblical and Cabbalistic features and Jewish mysticism was much in evidence: it followed the teaching of Noah, rather than Moses. Some of the words the Shaws deciphered were: Aba, Yaweh, Shalom, but also, very strangely, the Hebrew words for 'Holy Mother of Bethlehem'.

The work of Nellie and Conan Shaw was supported by Professor Hugh Schonfield, a Nobel Prize nominee, who was one of the scholars working on the Dead Sea Scrolls. Professor Schonfield's advice to the writer was "to dig deep and very carefully". So far her study has unearthed evidence which supports the Shaws theories about the ideas expressed in the Grotto being Biblical and Pythagorean, but the philosophical ideas of many other religions, cults and secret societies are indicated. One panel, described as a 'pot-plant', looks remarkably like a Philadelphus or Mock-Orange. The word 'Philadelphia' means 'lover of secrets'; in America it is translated as 'Brotherly love'.

In 1816 Charles Nodier published a curious and influential work "A History of Secret Societies in the Army Under Napoleon". He wrote of his own affiliation with a secret society which was Biblical and Pythagorean, and was called the "Philadelphes". In England Sir Isaac Newton was known to be a member of a secret society called the Philadelphians. The poet Alexander Pope was also a member of the same group, which met at the Gentlemen's Club at Spalding.

It seems that all the ancient mysteries, arts, sciences etc. are represented in the Margate Grotto: Isis, Bacchus, Demeter, Tanit, phallic symbols, astrology, numerology, druidism,, witchcraft, alchemy, the runes, magic and so on, all have their place in this mysterious Grotto: properly named, since the word means "crypt".

The thing that puzzled the writer most about the Grotto was its orientation, N and S and recalled the lines of Homer's Odyssey...

"Sacred then south from which the gods descend
But mortals enter at the northern end."

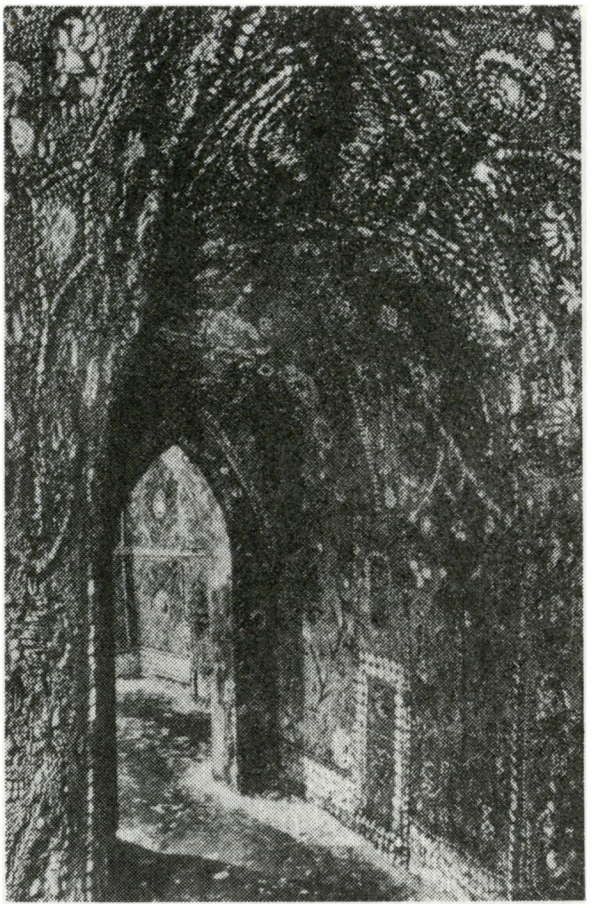
The entrance to the Grotto is in the N and the shrine is due S This suggests a classical connection, and in the writer's opinion, the Grotto is a Temple of Learning rather than a Temple of Worship. The whole place seems to be a college of wisdom down the ages. But not all the designs can be described as being 'ancient'. There is a candle in a chamber-like candlestick, identical to the one seen in the House of Mysteries in Paris. Some of the designs are very similar to the designs of the Tarot Cards of Charles VI of France (the Well Beloved) late 14th Century.

By far the most prominent motif in the Grotto is the rose. There are roses everywhere in the Grotto, and in the garden of Rose Lodge. The rose always represents something holy and something very secret. The expression 'sub rosa' refers to the strictest confidence. The rose is associated with Harpocrates, the Egyptian god of science, and in Christian iconography the rose represents the Rosa Coeli, the Virgin Mary, and the Rose Mystica, the Mystic Rose. The rose features in Moslem legend too, and in alchemy. Here in the Margate Grotto, religion and science come together secretly. For centuries the Church has been holding science back, and great men like Copernicus (1473-1543) and Galileo (1594 – 1642) were ordered to abandon their ideas, under threat of imprisonment or even death. Incidentally, it was only in 1838, the same year the Grotto was opened to the public, that the Copernican Theory was removed from the Papal list.

Science and religion meet in the conjoined symbol of the Rose and the Cross, but in the Margate Grotto a much earlier symbol is used, that of a large rose of seven layers, devised in the 17th Century by Robert Fludd and used by him as an illustration to represent the harmonious meeting of the law of three, the Trinity, and the law of four, the Elements, making seven.

The three main emblems of the shrine are the Rose, the Sun and the Crown. There is also a crown over the gothic archway leading to the chamber. This seems to suggest that Rose Lodge was under royal patronage.

On either side of the Royal Arch can be seen the united crosses of St. George and St. Andrew, with a rose in the centre. This suggests that the Royal Patronage was that of the Stuarts. We can therefore assume that the Grotto was constructed some time after 1603 when the Crowns of England and Scotland were united, and James became King of Great Britain, France and Ireland and Defender of the Faith. History records that it was the aim of James I and his grandson James II, who was a Roman Catholic, to secure peace through reconciliation of Protestants and Catholics. Under the Stuarts science and learning flourished.

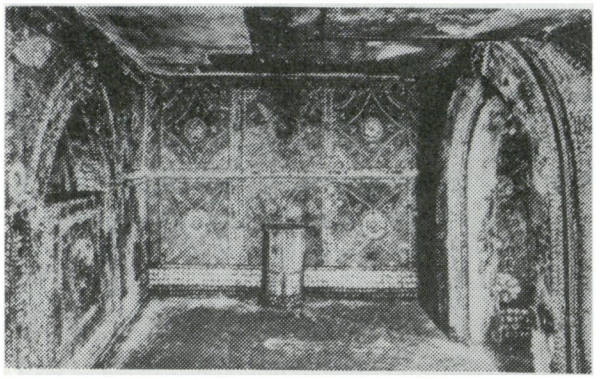


Entrance to chamber

A Christmas greeting in the form of an eight petalled rose, received by King James in 1623 from the German physician Michael Maier, bears a message in Latin, which when roughly translated means "Greetings to James, for a long time King of Great Britain. By your true protection may the rose be joyful".

Another important clue to the Grotto's origin can be found in the Astrology panel. The horoscope chart is that of the square type introduced by Robert Fludd (1574-1637). The son of a Kentish squire, he studied medicine at Oxford at a time when astrology was an essential part of the curriculum. He was admitted as a fellow of the College of Physicians in 1609, but only after a lot of opposition because of his unorthodox views.

Fludd was one of the conclave of scholars who presided over the translation of the King James Bible. He enjoyed the favour of James I and Charles I, both of whom granted him rents from lands in Suffolk. This means he was wealthy enough to establish the Golden Temple in the Margate Grotto. No doubt the monarchs visited Fludd for astrological guidance. Robert Fludd is well known for his writings on astrology, alchemy and other occult subjects. His most important work was the "History of Microcosm (1617-19). It is possible that he did his writing in the seclusion of the Margate Grotto. Of the Philosophers Stone, Fludd maintained this was purely allegorical. It



West end of rectangular chamber

referred to the transmuting of the base elements of man's lower nature into the 'gold' of intellectual and spiritual realisation. Those alchemists who achieved this transmutation were referred to as the Ormus or "golden ones".

The early Rosicrucians were Brothers of the Rosy (or Red) Cross. Only those men and women who had distinguished themselves in the arts and sciences were invited to join the Society. The philosopher Leibnitz is known to have gone to great endeavours to contact the Brothers of the Rosy Cross. They had invented a secret language, they healed the sick, they were non-sectarian, and they built themselves a House of the Holy Spirit.

Margate would have been an ideal meeting place for any secret society, being within easy reach of the Continent and of London via the Thames. Before King Street was built, there used to be a creek reaching right up to Rose Lodge.

The scientist Robert Boyle, who was one of the first public figures to offer allegiance to the Stuarts on the Restoration of the Monarchy, frequently mentioned in his letters an "Invisible College" which he sometimes attended, and which he thought to be a sort of precursor to the Royal Society founded in 1660.

In his ROSY CROSS UNVEILED Christopher McIntosh said that it seemed likely that the Royal Society was an attempt to realise in practical terms the Rosicrucian ideals of a Brotherhood of learning and enlightenment.

The aims of the elderly Rosicrucian Society were to "seek the truth, and prove it when found: Also to free from Sophistry (or fallacious reasoning) all arts and sciences founded on reason and experience, and lead them back to demonstrable certainty, and to propagate them through correct instruction: to increase them through happy invention". By "happy invention" probably meant education through games: many of the designs in the Grotto appear to represent dominoes and playing cards. Traditional playing cards have on the back an eight-petalled rose.

The American Max Heindel described the original Rosicrucian Temple as an etheric structure located in and around the home of a European country gentleman. He believed that the "invisible" building would ultimately be moved to the American continent.

The Grotto at Margate is no longer "invisible", and further research could show it to be a veritable 'gold mine' of information.

In conclusion: a word of warning from the immortal poet Alexander Pope:

"Approach Great Nature studiously behold
And eye the mine without a wish for gold."

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Quarrying tools and other artefacts from the Chaldon and Merstham Quarries, Surrey.

Peter Burgess

EXTRACTION METHODS AND LIGHTING

In the 25 years or so that the firestone quarries of Merstham and Chaldon have been accessible, one notable feature common to all the workings is the scarcity of quarry-related artefacts. Much of the theory of quarrying methods used in these old workings has been based on less tangible evidence such as the passage form revealed by surveying, the marks left by the quarrymens' tools, and the impressions left in the soft floor by draught animals, and by the devices used for transporting the stone.

This dearth of material is in stark contrast to the situation at Godstone where in 1978 the re-entry of Marden Mine revealed a profusion of stone picks, wedges, lamps, tramway relics and other miscellaneous items. It is fair to suggest that the quantity of tooling etc. abandoned in any of the old quarries of the district is very roughly in inverse proportion to the value that the quarrymen of the relevant period placed on their equipment. The artefacts from Marden were left by the 20th Century workers, employed by the quarry owner or lessee, who is likely to have been responsible for the tools used. With no further use for these tools when Marden was abandoned, the operator would have had little incentive to recover them from the galleries where they had been left by the last active quarrymen.

The Merstham and Chaldon quarries however were worked in a period when it was the practice of manual workers in a whole variety of trades to own their tools outright. With such a personal responsibility, it is not surprising that so few discarded or mislaid tools are discovered today. Whenever possible, broken tools would have been repaired rather than replaced, and blunt cutting tools such as picks would be resharpened many times before reaching the end of their useful life.

What can be deduced, then, from the artefacts and other evidence, regarding the extraction methods employed? The most fundamental tool of the quarryman was his pick. This is made overwhelmingly clear by the great profusions of marks on the walls, roof, and where exposed, the floor. Nearly all these marks were made by pointed picks, evidently kept very sharp. As far as is known, only one iron pick has ever been discovered in the whole extent of the Chaldon Bottom quarries, and none have been found in the less extensive workings at Quarry Dean. This pick is 27 cm [11ins] long, and has been formed from a bar of iron formed into a loop around the now missing haft, with the two ends forged into a single tapering head. The pick bears a simple cross pattern on one side which could be interpreted as an identification mark, either the symbol of the blacksmith, or more likely, that of the owner. This object was found in the far eastern end of the quarry, an area regarded by some as the area of most recent activity at Chaldon. The pick, nevertheless, is likely to date at least from the 17th century.

Turning back to the pick marks on the walls and roof of the galleries, the sweeping arc patterns on the walls bear out the often quoted theory of face working whereby vertical slots were cut at both extremities of the face. A similar but broader cut was made across the top of the face; remnants of vertical and horizontal cuts may be found at several places throughout the workings. However, the sweeping curves that characterise the walls are never seen on the roof, possibly because with the greater clearance available for swinging the pick it was possible to attack the face from both the left and the right. This has left a pattern of oblique marks generally at right angles to one another.

Marks from the pointed pick are also to be found on roughly squared blocks of stone, or ashlar, that have for some reason not been removed to the surface. Also visible on such blocks are areas smoothed using a blade approximately 2.5cm [1in] across. Areas of these chisel-like marks can also be found occasionally on the gallery walls and roof. It is not clear whether these marks were made by the use of a mallet and chisel, or by an adze-like implement. Only one hammerhead is reported to have been found. It was found in 1960 in the older eastern workings at Quarry Dean. It is double headed, about 19cm [7 1/2 ins] long and 2.7kg [6lb] in weight. The whereabouts of this important find is not known to the author.

The only other extractive tools known to have been used are iron wedges. These were used to split the partly detached blocks from the face. The marks left by these wedges and the holes into which they were placed can be seen at many of the accessible faces. Two examples of wedges *in situ* in the sockets cut for them are known. (fig. 1) The wedges themselves come to light from time to time, about a dozen have been deposited in the Croydon Natural History and Scientific Society museum. The wedges

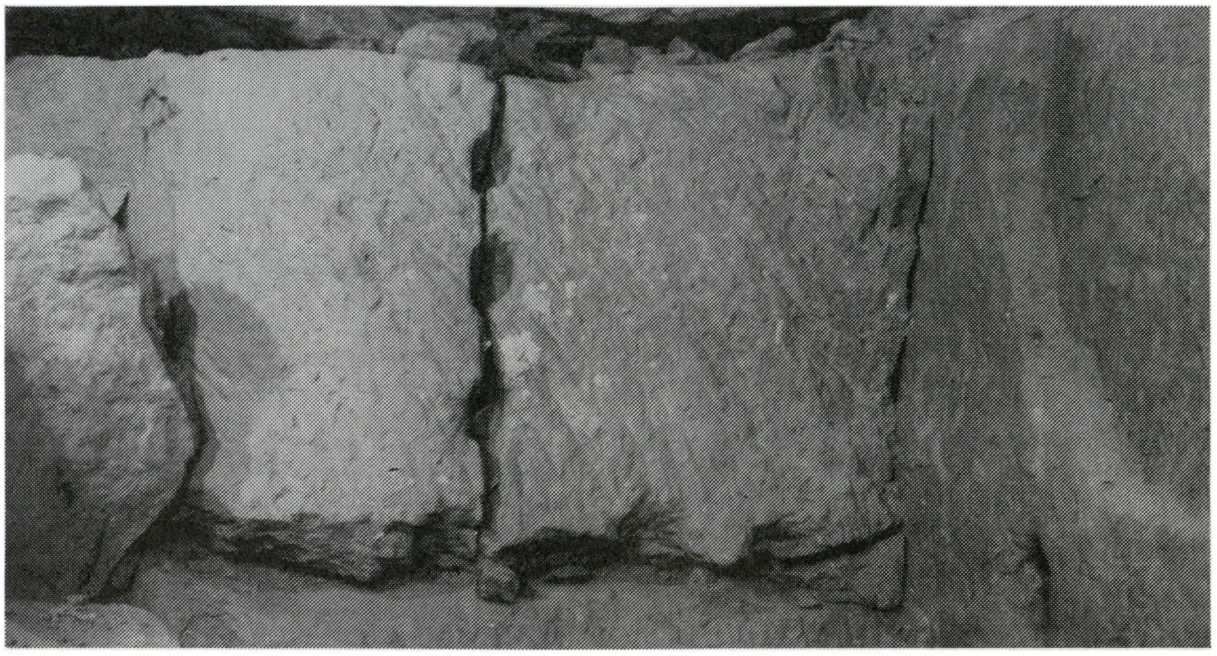


FIG. 1 IRON WEDGE *IN SITU*

from the 18th and 19th century workings at Quarry Dean tend to be heavier than those found in the Chaldon quarries. The often used plug and feather method of splitting stone at many other quarries in Britain does not appear to have been used in the firestone workings. Perhaps the stone is too soft to warrant it!

The extraction of blocks of stone produced a large amount of waste in the form of large lumps of (presumably) inferior stone, and a great quantity of chippings and dust. This had to be cleared away from the face to permit ease of working. No firm evidence exists to explain how this was done. Where the lighter waste has been dumped in worked out galleries, and where this waste has not been disturbed by modern visitors, it is possible to see individual mounds of spoil, each equivalent to a full load of a modern wheelbarrow. It is only an assumption that wheel or hand barrows were used at Chaldon workings, as no remains have ever been found there. In the 18th and 19th century at Quarry Dean however, the wrought iron remains of what are interpreted as two wheelbarrows can be seen, although much mutilated by recent visitors.

Late in 1985, a fragment of iron was found in the Ockley Wood area of the Chaldon workings that has been tentatively identified as part of a shovel. Such a tool would have been used to fill barrows with loose waste, and to clear away the clay-like material that accumulates on the damp floor of the haulage galleries. This sticky mud hindered the haulage of stone to the surface and was periodically cast up onto the sides of the passage by shovel. Where conditions have allowed these clods to remain intact they can still be seen with the parallel marks caused by the cutting edge of the shovel on one side, and occasionally the foot or hoof prints of the draught animals on the other side. Inspection of these clods is a very delicate business, and is not, as a rule, encouraged.

The object found appears to be the metal cutting edge of a securing brace for what was otherwise a wooden shovel. A second securing brace is missing. The complete object would have formed a squared U-shape with a cutting edge 5cm [2ins] deep and at least 15cm [6ins] wide at the bottom with two sturdy vertical braces either side of the wooden blade, about 30cm [12ins] long. Early shovels from prehistory to the Medieval period were often made entirely of wood and iron was introduced gradually to provide a more durable cutting edge to the tools. It is only in comparatively recent times that the whole shovel blades made of iron or steel have come into common use. It can be assumed that the object, found lying in a heavily backfilled area, was discarded when it broke and was not considered worth repairing.

Evidence for lighting methods is very scarce. Many soot marks on the roof can be seen but very little remains to suggest what caused them. The source of light most likely to have been used is the tallow candle. This was the cheapest and most widespread form of lighting up to the 19th century both above and below ground. The use of oil lanterns for domestic lighting became common in the 19th century, but below ground the candle was used in all the active Upper Greensand workings until the 20th century. At Colley Hill hearthstone mine, near Reigate, candles were used right up to closure in 1961. In the Chaldon quarries the candles were attached to pillar corners with lumps of clay. Three such clay lumps are known to the author. Two are *in situ* underground and one is preserved in the CNHSS museum. Each has a hole in the centre where the candle has left an impression. Two round blocks of firestone have also been found, with a hole cut through their centres. These have been interpreted as candle holders, both stones being easily carried in the hand. Their flat bases would have allowed the

blocks to have been placed on the ground or on

and being rather thin. Most of the shoes show
considerable wear on the leading edge, and a

Recently discovered Souterrains in Co. Cork

Rose M. Cleary

KIVUVRRA (FIG. 1)

This souterrain (1) was discovered in June 1983 on the land of Mr. Young . The roof of one chamber collapsed in for no apparent reason. The souterrain consisted of at least three chambers, but it was not possible to enter two of these because they were filled with soil. The souterrain probably belongs to McCarthy's type C. This example may be of type C2 which consists of a string of chambers in a straight line or in a semi-circle (McCarthy, 41)(2). Including Carrigdarrery (below), this brings the total known number to 10.

The surveyed portion consisted of a single earth-cut chamber that was oval in plan, with a maximum length (NW/SE) of 2.9m and a width of 1.5m (SW/NE). The estimated chamber height was c. 1m. Almost the entire ceiling had collapsed. Two creepways led from the N end of the chamber. That on the W was 50cm wide and 40cm high, while the eastern creepway was 70cm wide and 60cm high.

CARRIGDARRERY (FIG. 2)

This souterrain (3) was discovered during ploughing on the land of Mr. T. Fitzgerald. The site was exposed for some time before it was surveyed, but remained relatively intact. The souterrain was rock-cut. Access was through the roof of either Chamber 1 or 2, both of which had collapsed.

CHAMBER 1

This was irregular in plan, with a maximum length of 2m (N/S) and width of 84cm (E/W). Much of the roof of this chamber had collapsed in and it was impossible to estimate the original height. A narrow creepway, 90cm in length

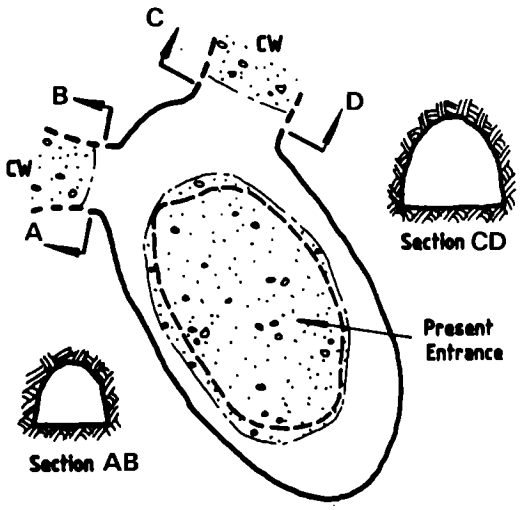
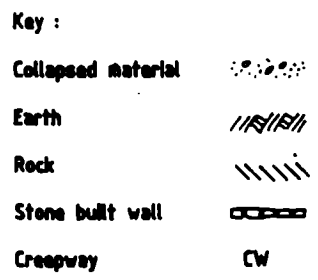


Fig 1. Kilvurra



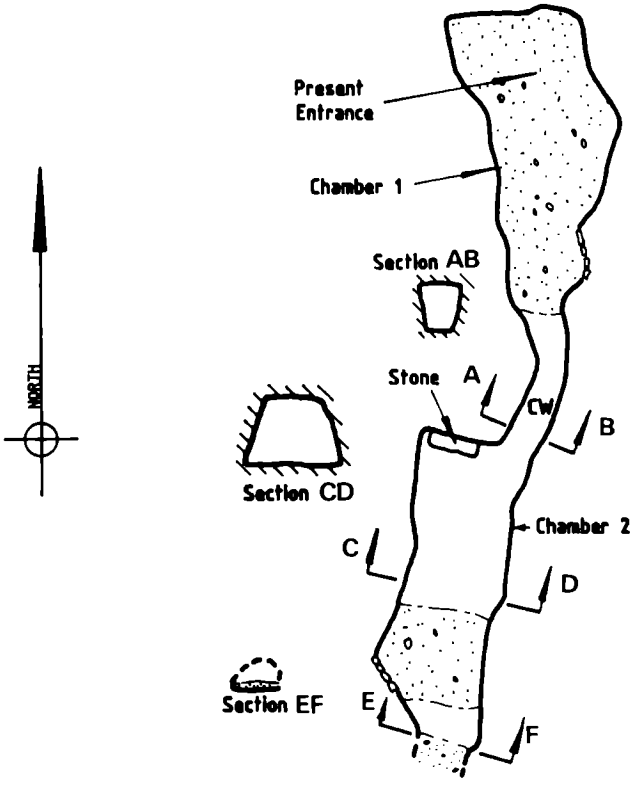


Fig 2. Carrigdarrery

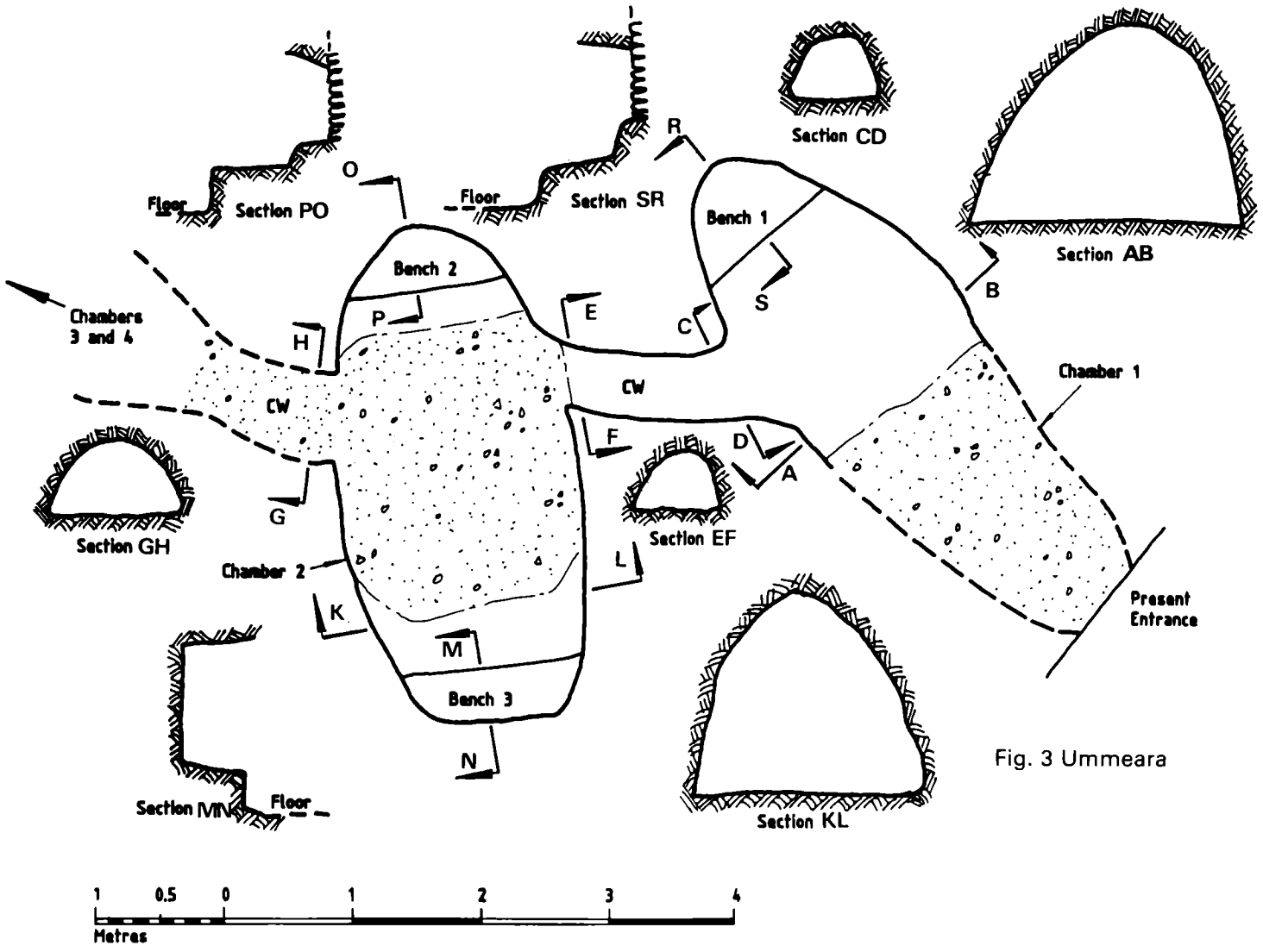


Fig. 3 Ummeara

and c. 30cm in width, led from the S end of Chamber 1. The walls of this tapered outwards towards the ceiling (Section A-B, Fig 2). A construction shaft (4) formed part of the E wall of Chamber 1. This was built from shaley stones and ran from floor to ceiling.

CHAMBER 2

This was roughly rectangular but tapered towards its southern end; the creepway led in from Chamber 1. The maximum length was 1.95m (N/S) and the width was 70cm. The walls tapered inwards towards the ceiling (Section C-D fig 2) and the maximum height was 55cm. A stone, 34cm long and 12cm thick, rested against the N end of the chamber. A construction shaft formed part of the southern wall. This went from floor to ceiling height. The southern end of the chamber narrowed to 40cm and another creepway opened at some time from here either into another chamber or the original entrance. (section E-F, Fig 2) This creepway was blocked by soil which curtailed the survey of this area.

DISCUSSION

The souterrain is typical of McCarthy's C2 type. An unusual feature was the stone adjacent to the N creepway opening in Chamber 2. This may have functioned as a closing stone for the creepway. McCarthy (op.cit. 69-76) suggests that souterrains were used as food storage areas or places of refuge. It may have been necessary to close off sections of the souterrain if food was to be kept over a long period of time to prevent contamination, e.g. from small animals such as mice. If the souterrain was used as a place of refuge, such stones could have protected the occupants. However, in this instance, this function seems unlikely because the stone is placed at the wrong end of the creepway and should have been placed at the Chamber 1 end. In the present situation, the stone could easily have been rolled back by any attackers.

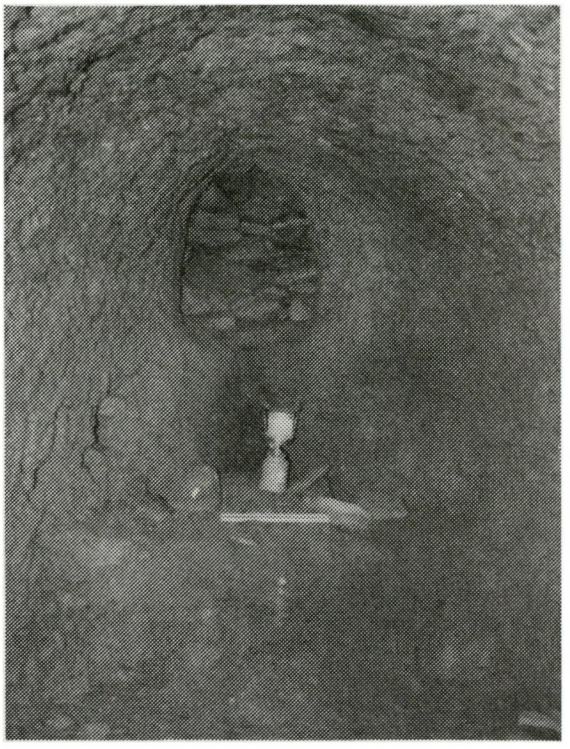
UMMEARA (FIGS. 3 & 4)

This souterrain (5) was uncovered during the construction of an access road to a building site. The site lies on the land of Mr. O'Leary and is adjacent to the Coachford-Macroom road. The find was reported to the Department of Archaeology, University College, Cork by members of the local Macroom Historical Archaeological and Literary Society and subsequently visited. Continued use of the access road over the souterrain made the

structure unstable. Consequently, it was only possible to survey two chambers. The souterrain consisted of a minimum of four chambers and belongs to McCarthy's Type C3, i.e. "a series of chambers with long axes parallel" (op.cit. 41). The present entrance may have been original and would have led from Chamber 1 out onto the hillside. It was noted during the survey that the soil from a creepway in Chamber 3 was very humic and it may have been, in fact, a second entrance.

CHAMBER 1

This was sub-rectangular in plan with a long axis running NW/SE. The maximum length was 4.7m and width was 1.8m. Where best preserved, the chamber was 1.6m high (Section A-B fig 3). The SE end was covered with soil shed from the ceiling. A creepway, 80cm wide, 60cm high and 1.6m long, led from Chamber 1 into Chamber 2 (sections C-D and E-F, Fig 3). A feature of the chamber was the 'bench' on the NW end. This was earth-cut and was 35cm above the floor level and extended across the whole width of the chamber, i.e. for 1.3m. A construction shaft formed part of the end wall of the chamber above the bench (Section R-S Fig. 3). This shaft was infilled with 8-9 courses of dry-stone masonry.



Bench and construction shaft, Chamber 1

CHAMBER 2

This was sub-rectangular, with a long axis running NNE/SSW. The maximum length was 4m and the width 1.8m. The ceiling had shed a considerable amount of soil, but where intact, was 1.65m high (section K-L, Fig. 3). Bench 1 occupied the NE end of the souterrain. This was 35cm above floor level and extended across the floor width, i.e. for 1.2m. A construction shaft formed the back wall (Section O-P, Fig 3). The construction shaft was again infilled with 8-9 courses of dry stone masonry. Bench 2 was on the SW end of the chamber. This was 35cm above the floor level and extended back to the wall for 50cm. The bench was 1.5m wide (Section M-N fig. 3). A creepway 1.1m wide and 60cm high led from Chamber 2 into chamber 3 and 4 (section G-H, fig 3)

Chambers 3 and 4 lay on the NW side of Chamber 2. These were also sub-rectangular in plan but were not surveyed because of imminent collapse.

DISCUSSION

The souterrain is typical of McCarthy's type C3. The benches recorded in Chambers 1 and 2 are unusual features of souterrain architecture. Benches were recorded by McCarthy at Duniskey 1, Co. Cork (op.cit. 225-238). In the Duniskey example, the benches were rock-cut and occupied the entire wall length of Chamber 3 and part of the wall of Chamber 5. These were probably used as seating.

None of the above sites was apparently associated with field monuments. Neither the 1st nor 2nd editions of the Ordnance Survey maps record monuments at the various locations. This is not unusual since McCarthy (op.cit, 45) notes that 33% of Co. Cork souterrains are unassociated though it is possible that any earthworks were obliterated before the 1st Ordnance Survey edition maps. The above souterrains are all located on hillsides McCarthy (op. cit. 47) notes that one eighth of Co. Cork souterrains are on hillsides. This is similar in pattern to the ringfort locations and may also be due to the souterrain builders taking advantage of natural drainage. The distribution of the souterrain types, i.e. C2 & C3, is similar to that observed by McCarthy. The C2 type is generally S of the River Blackwater, while C3 is S of the River Lee.

NOTES

1 Exact location: O.S. 6" scale sheet No 121. Co.Cork. 2.5cm from N margin; 16.9cm from E margin. By. East Carbery; Ph. Ballymoney; Td. Kilvurra. c.500' above O.D. on S-facing slope.

2 McCarthy J.P., 1977, THE SOUTERRAINS OF COUNTY CORK Unpublished M.A. thesis, UCC.

3 Exact location: O.S. 6" scale sheet, No 83. Co.Cork. 13.7cm from N margin; 48.2cm from W margin. By. West Muskery; Ph. Kilmurry; Td. Carrigdarrery. c. 300' above O.D, on N facing slope.

4 A construction shaft is a pit excavated vertically down from ground level and from here the souterrain is tunnelled out. After completion of the souterrain, the pit is built up at the bottom with small boulders. This masonry prevents subsidence (McCarthy, 1977, 54-55)

5 Exact location: O.S. 6" scale sheet No. 71, Co. Cork. 25cm from W margin; 29cm from N margin. By. East Muskery; Ph. Aghinagh; Td. Ummeara. c. 400' above O.D. on S-facing slope.

The tubes in wartime

Peter Bancroft

The British Government declared that a state of war existed between Great Britain and Germany as from 11pm (London time) on August 4th, 1914. The immediate effect of this declaration on the British railway companies was that an Order in Council, provided for by section 16 of the Regulation of the Forces Act 1871 was made, and Mr. Asquith, as Secretary of State for war, issued a warrant empowering the President of the Board of Trade to take control of the railways of Great Britain.

The Government's purpose in taking control of the railways was to ensure, in the words of Herbert Ashcombe Walker, that they should be used as one complete unit in the best interests of the State for movement of troops, stores and food supplies. The control would be exercised through an Executive Committee composed of General Managers of the Caledonian Railway, Great Central Railway, Great Northern Railway, Great Western Railway, London and North Western Railway, Lancashire and Yorkshire Railway, London and South Western Railway, Midland Railway, North Eastern Railway and South Eastern and Chatham Railway. This Railway Executive Committee, under the nominal chairmanship of the President of the Board of Trade was in practice headed by Herbert Ashcombe Walker, General Manager of the London and South Western Railway. The railway secretary to the committee was Gilbert S. Szlumper, who was Walker's personal assistant at Waterloo, having been appointed to this position on 1 February 1914.

The Order in Council allowed the Government to take control of ALL railways in Great Britain, but as a result of the Government's desire only to exercise control over those lines that would or might, either directly or indirectly be concerned with the transport of traffic of national importance, some 46 railway companies were not taken over, of which in the London area the following must be noted:

> Central London Railway, City and South London Railway, London Electric Railway, Lots Road Power House Joint Committee Underground Electric Railways Company of London Watford, Edgware and London Railway.

Dealing with the other railway companies in turn, their extent in 1914 was as follows:

The Central London Railway ran from Liverpool Street to Wood Lane, the entire line running in deep tubes except for the approaches to Wood Lane and the station and depot there.

The City and South London Railway ran from Clapham Common to Euston, wholly in deep tubes and was only linked to the surface at Stockwell via a 20 ton Waygood hydraulic lift, capable of carrying one car or one locomotive. This lift had in fact replaced the original 1 in 3 1/2 incline used to bring rolling stock to the surface depot until 1906.

The London Electric Railway was in fact the amalgamation of three separately promoted and nominally independent railways. These were, firstly, the Great Northern Picadilly and Brompton Railway, which ran from Finsbury Park to Hammersmith, and included a small branch line from Holborn to Strand (renamed Aldwych on 9 May 1915). The line surfaced only at the western end for Barons Court and Hammersmith stations and access to the depot at Lillie Bridge. Secondly, the Baker Street and Waterloo Railway which ran from Elephant and Castle to Paddington, sited in deep tubes, and only linked to the surface by the ramps at London Road, gave access to the depot at surface level. And thirdly, the Charing Cross, Euston and Hampstead Railway, which ran from Charing Cross to Golders Green or Highgate, via the original junction at Camden Town. The southern terminus at Charing Cross was in practice a single track one way loop on which the platform at Charing Cross was located. A part of the loop line ran under the River Thames.

All the tube railways thus described were relatively short, isolated lines, running for the most part in deep tubes of restricted loading guage. They did not carry goods and indeed their day to day operation would be almost unaffected by the war, apart from the loss of staff taking up active service.

The position as regards the other two operating companies not taken over is as follows:

Lots Road Power House Joint Committee was established by the Metropolitan District Railway Act of 1911 and consisted of representatives of the District and London Electric Railways. Lots Road Power Station itself was then sold to the Committee by the Underground Company, and the committee then leased it back to the two railway companies, thereby ensuring that it could not be sold to an outside interest with no guarantee to supply power to the District Railway and the three London Electric Railway tube lines. Although the Government did not take control of the Joint Committee, it did have an effective representation through its control of the Metropolitan District Railway, who were themselves represented on the Joint Committee.

The Underground Electric Railways Company

of London Limited, was essentially a holding company, largely divorced from the day to day operations of its subordinate railway companies, and one not necessary therefore, to be taken control of by the Government.

But the East London Railway, Metropolitan Railway, Metropolitan District Railway and Whitechapel and Bow Railway were taken over, and the significance of these short, fully sub-surface railway lines largely results from their affording important connections between the main line railways N and S or E or W of London. The East London Railway and the Metropolitan Railway widened lines, with their connection through Snow Hill to Blackfriars and S London, were especially important.

However, the tube railways continued to operate normally although they benefitted financially from an increase in traffic partly due to large numbers of soldiers using them to cross from one main line terminus to another. To ease this movement during the initial period of mobilisation, the Underground Group allowed all men in uniform to travel free. This concession ceased on 1st October 1914. The shortage of staff and vehicles available for road services also tended to throw additional traffic onto the tubes. The "dim-out" enforced after dark also encouraged people to use the tubes where normal lighting was still in use.

Altogether some 3,086 staff (around 49%) from the Metropolitan District Railway and the tubes, and some 1,181 staff (around 29%) from the Metropolitan Railway were released for war service. From the spring of 1915 "women substitutes", as they were usually called, were employed to fill job vacancies, although these were only temporary jobs and were in addition to the recruitment of untrained labour preferred up to that time.

The only extension to the underground railways opened during the war was on the Bakerloo Tube Line. Services were extended from Paddington to Kilburn Park on 31st January 1915 and from Kilburn Park to Queen's Park on 11th February 1915. Bakerloo tube trains were then projected over the newly built London and North Western Railway Line, first to Willesden Junction (new station) on 10 May 1915, and finally to Watford Junction on 16 April 1917. Maida Vale station, between Warwick Avenue and Kilburn Park did not open until 6th June 1915, and was staffed completely by women from the opening date. Warwick Avenue, Maida Vale and Kilburn Park were additional deep tunnel stations on the tube extension.

Although the underground and tube railways remained largely unaffected by the progress of the war, they were to provide useful, and in the case of the tubes, relatively safe protection from the enemy airship raids, which began in London on 17 August 1915.

Airship raids over England had been sanctioned by the Kaiser on 9 January 1915. Instructions were apparently given by him that attacks were to be made on naval and military installations only, and that London itself was not to be bombed. Of course, the skill of the bomb-aimers was not equal to this demand and consequently, London was bombed 12 times by airship. Precautions against these raids had begun on 10 September 1914 and required on the main line and surface railways the darkening of lights (not yet known as 'black-out') and suspension of traffic during raids. However, interruptions to traffic on the Metropolitan and Metropolitan District was negligible.

But by early 1917, the Zeppelins had become death traps in the face of the new generation of allied fighter planes. From May 1917, therefore the Zeppelins, which had been attacking Britain were replaced by fleets of up to 40 or so heavy bombers, such as the Gotha G. IV and G.V, and the Staaken R.VI. These raids caused extensive damage, but the aeroplanes were not employed in sufficient concentrations to have a serious effect on the course of the war. Altogether, 19 aeroplane raids were made on London. The first daylight raid over London took place on 28th November 1916 apparently involving only one aeroplane. This was probably to test the practicability of such action. Two heavy daylight air-raids on London by Gotha bombers during June and July 1917 caused 832 casualties alone, 216 of which were fatal. Altogether in London during World War 1, 670 people were killed and 1960 injured. Naturally the civilian population, for the first time exposed to the enemy's fire and unable to shelter behind the navy or expeditionary force, took to sheltering from the raids. The underground was the obvious choice and large crowds took shelter during these daylight attacks.

From July 1917, the Underground Companies agreed to allow their station passages and platforms to be used by shelterers. During the sustained aeroplane raids of August and September 1917, many shelterers camped semi-permanently in the tubes. Some even camped in the trains, of which the Inner Circle trains were particularly useful. Some regulation of the shelterers was soon required and the following notice was then posted at stations.

> AIR RAID SHELTER
> Persons may shelter here at their own risk after the take cover notice has been given. Persons sheltering here are not allowed to take Birds, Dogs, Cats, and other Animals as well as Mailcarts, on to the Company's premises.

It is said that over 4,250,000 people had taken advantage of this invitation to shelter before the end of World War 1, and as many as 300,000 people are reported to have crowded into the underground for shelter on the single night of 18th February 1918.

The last raid on London was made by some 30 aeroplanes on Whit-Sunday 19 May 1918, when 43 civilians were killed and 150 injured.

Some parts of the tube system were used for

purposes other than sheltering civilians, notably for storage of museum treasures and paintings.

In June 1917, the Director of the National Gallery, C.J.Holmes, approached the Underground Company with a view to finding some secure accommodation for some of its paintings. The Underground Company subsequently offered the National Gallery the disused platform at Aldwych (formerly Strand). With the backing of the Office of Works and the Treasury, the platform was sealed off and altered. A refrigerator drying system was installed and from September 1917 some 300 pictures, about one tenth of the National Gallery's collection, were housed there. So they remained there until December 1918.

In December 1917, the Office of Works called a meeting with other galleries and museums to see what measures could be taken to protect further treasures and records. This followed approval by the War Cabinet to Sir Alfred Mond and H. Fisher's proposal to remove the most precious treasures from the Public Record Office, British Museum and other principal museums and galleries, to some place of safety. A visit was hastily arranged to King Edward Building, which was the site of a station on the Post Office Railway, then under construction. The running tunnels and station tunnels appear to have been completed around this time, but it is thought that little track laying or fitting out had taken place. John Mowlem and Company therefore carried out some preliminary work for adapting the tunnels for shelter use from 2nd April 1918. Accommodation in the Post Office Railway was used as follows:

The Tate Gallery, National Portrait Gallery and Public Record Office stored parts of their collection in station tunnels at King Edward Building. The British Museum used the tunnels of the West Central District Office station at Holborn, and the Wallace Collection and apparently some of the King's paintings were kept at the Post Office railway station at Paddington. The Victoria and Albert Museum declined the offer to use the Post Office Railway tunnels, preferring instead to use the nearby spare station tunnel at South Kensington, evidently shared with some cases of Buckingham Palace china.

Several museums also transferred exhibits away from the London area, often to country houses, by arrangement with the house owners.

One of the problems which the underground companies had appreciated from the early part of the war, was the danger of flooding of their tunnels from the River Thames, should one of the under river tunnel sections be breached. As a precaution against flooding from the under-river tunnels on the Bakerloo line, 4 temporary timber-baulk barriers were formed. These consisted of steel framework supports into which heavy timber baulks could be dropped to seal the twin tunnel mouths at the S end of Charing Cross station and the N end of Waterloo station on the Bakerloo line. Each barrier could be erected in about 45 – 55 minutes by about 10 men, but they were only designed to check immediate flooding and thus to save life. The arrangements required the permanent allocation of around 100 men to cover three shifts.

By the end of 1915, the London Electric Railway Company's engineer, Z.E. Knapp, had given further consideration to the problem of flooding and now proposed that permanent doors should be installed in place of the temporary bulkheads, which were then being maintained. Knapp sent a memorandum on the subject to his directors and consulted Sir John Wolfe Barry, an eminent engineer, about the proposed measures. Barry agreed that something should be done and made several suggestions to improve Knapp's design of doors, outlining these in his preliminary report dated 18th February 1916, addressed to Sir Albert Stanley, Managing Director of the Underground Group as a whole.

On 25th November 1916, representatives of the London Electric Railway visited the offices of the Ministry of Munitions of War, to discuss the matter of the supply of the required steel. In conjunction with Messrs. Rendel, Palmer and Tritton, Consulting Engineers, acting for the London Electric Railway, final plans for the construction of 4 protective gates were then prepared. These would require 136 tons of mild steel and 34 tons of cast steel. The cost of manufacturing, supplying and installing the 4 gates was estimated to be £25,000. A formal application was then made to the Priority Branch of the Ministry of Munitions of War, for the allocation of steel required, but they, after carefully weighing the question of the necessity and relative urgency in the matter of the gates, refused to allow priority of manufacture at that time. The London Electric Railway directors instructed their Company's Secretary to write to the Ministry of Munitions of War to place on record that they could not be held liable nor responsible should any consequence occur with regard to withholding the steel for the gates. Further letters were exchanged in which the London Electric Railway emphasised the dangers which would result if a fracture of any of the tunnels under the Thames occurred, either as a result of a bomb dropping into the river, or an explosion actually in the tunnels. At least 65 miles of single track would be flooded and if it happened when trains were in the tunnels, the loss of life would be appalling. Enormous interference with London traffic would result. This appeal softened the Ministry's response, although their reaction was initially only to ask if the gates could be made of wood, or wood with shell discard steel. The engineers were consulted but said that this was impossible as the gates were required to resist a pressure of 210 tons. However, shell discard steel could be used in some parts of the gates which would reduce the amount of new steel required. The Ministry were informed but still withheld permission for supply of the required steel in their reply dated I June 1917.

In November 1917, the Board of Trade, who had originally been involved in discussions with the Ministry of Munitions of War about the gates, intervened, and suggested a meeting of interested parties. This was arranged for 26th November 1917. At this meeting Mr. Dalrymple Hay, another consultant engineer, raised the matter of providing an 'inner skin' for the under – river tubes, which would not only prevent flooding owing to enemy action, but would also obviate the possibility of damage being caused to the tunnel by the derailment of a train. This 'inner skin' would require 440 tons of steel. Sir John Wolfe Barry said there were two risks, one external which might be caused by a vessel grounding over the tube as well as bombs dropped from above, and one internal, due to the possibility of a bomb being placed in the tunnel. Colonel Pringle of the Board of Trade suggested that guardrails would be a solution to the question of derailment. The outcome of these discussions was that the London Electric Railway should consider the use of iron for the gates, and that if this was not possible, then the only alternative would be to obtain steel from America, although this would take a considerable time. Matters dragged on and nothing was done as regards any form of permanent protection until after the war. The temporary timber bulkheads were therefore the only protection available throughout the whole period of World War 1. It should be noted that these protective measures only applied to the Bakerloo tubes, which were those closest to the surface and therefore most vulnerable to the various risks of being damaged.

The war ended with the Germans signing an armistice on 11 November 1918.

The problems of potential flooding, even in peacetime, must have been a continual cause for concern, and in 1919 a secondary lining of armour plate was installed in the Bakerloo line river tunnels, for a length of about 540 feet [165m] in the southbound tunnel and 480 feet [150m] in the northbound tunnel. This was circular in shape above track formation level, but under the track, the lining was placed across a chord, rather than round the circumference of the tunnel. The invert below the lining was filled with concrete. The standard track was replaced by bridge rails (to reduce the height) fastened onto longitudinal timbers resting on the armour plate lining. Track alignment was maintained by concreting outside the timbers in the spaces up to the circular parts of the lining on each side of the tunnel.

SOME NOTES ON FURTHER READING

(publications about London Transport generally also include coverage of aspects other than those affecting just the railways of London Transport or its predecessors.)

FIRST WORLD WAR

1. BRITISH RAILWAYS AND THE GREAT WAR, organisation, Efforts, Difficulties and Achievements, by Pratt, Edwin A. (Selwyn and Blount, Ltd.) 1921, published in two volumes, but especially Vol. 1 pages 49 – 72, 370 – 371 and 416 – 420.

2. A HISTORY OF LONDON TRANSPORT – VOLUME 2, The Twentieth Century to 1970, by Barker, T.C. and Robbins, Michael (George Allen and Unwin Ltd.) 1974 – Chapter 9 – The War 1914-1918, pages 192 – 201,

3. RAILS THROUGH THE CLAY, A history of London's tube railways, by Jackson, Alan A., and Croome, Desmond F. (George Allen and Unwin Ltd.) 1962 – Chapter 8 – The tubes in wartime, pages 155 – 164.

SECOND WORLD WAR

4. LONDON TRANSPORT CARRIED ON, An account of London Transport at War 1939 – 1945, by Graves, Charles (London Passenger Transport Board) 1947. REPRINTED AS: LONDON TRANSPORT AT WAR 1939 – 1945 by Graves, Charles (Almark Publishing Co. Ltd.) 1974, and again as: LONDON TRANSPORT AT WAR, by Graves, Charles (London Transport) 1978.

5. SEVEN BATTALIONS, The story of London Transport's Home Guard 1940 – 1946, published by the London Passenger Transport Board, 1947.

6. LONDON PASSENGER TRANSPORT BOARD, TWELFTH ANNUAL REPORT AND ACCOUNTS, Year ended 31 December 1945, published by the London Passenger Transport Board, 1946. This contains an excellent 22 page report entitled 'The Board and the War'. (The Board's SIXTH ANNUAL REPORT AND ACCOUNTS, Year ended 30 June 1939; SEVENTH ANNUAL REPORT AND ACCOUNTS, Eighteen months ended 31 December 1940; and ELEVENTH ANNUAL REPORT AND ACCOUNTS, For the year ended 31 December 1944, also contain items of interest.)

7. A HISTORY OF LONDON TRANSPORT VOLUME 2, The Twentieth Century to 1970, by Baker, T.C. and Robbins, Michael (George Allen and Unwin Ltd.) 1974 – Chapter 16 – 'The London Passenger Transport Board', especially pages 304 – 309.

8. RAILS THROUGH THE CLAY, A history of London's tube railways by Jackson, Alan A., and Croome, Desmond F. (George Allen and Unwin Ltd.) 1962 – Chapter 12 – 'The Tubes in Wartime (2) 1939 – 1945, especially pages 294 – 309.

9. THE STORY OF LONDON'S UNDERGROUND, by Day, John R. (London Transport) 1979, Chapter 13, 'The Second World War', pages 100 – 105. (Earlier editions of this book were published in various forms in 1963, 1966, 1969, 1971, 1972 and 1974 containing similar information about the Second World War.)

10. RAILWAYS AND THE WAR – 2, (An illustrated article) by Lee, Charles E. in THE RAILWAY MAGAZINE for December 1939 pages 395 – 401, gives an interesting account of some of the floodgates and flood protection work carried out on London Transport's railways during the period from September 1938 to the later part of 1939.

11. SHELTERING IN LONDON TUBE STATIONS, (An illustrated article) by Lee, Charles E. in THE RAILWAY MAGAZINE for September 1941 pages 385 – 389, is a review of the arrangements made for sheltering on the platforms of London Transport's tube stations from 7 September 1940 to the summer of 1941

12. THE SECRET UNDERGROUND RAILWAY EXECUTIVE H.Q., (In the former Down Street tube station on London Transport's Piccadilly Line) is described in some detail (including plans and illustrations) in the issue of No. 12 of AFTER THE BATTLE, published in 1976 by Plaistow Press Magazines Ltd.

13. THE ENGINEER, Contains three articles on the Deep Tunnel Air Raid Shelters, constructed during the Second World War, in the issues of 27th November, 4th December and 11th December 1942. These were also produced together as a booklet at some time.

A tunnel in the Bayeux Tapestry

Derek Renn

The eleventh century embroidery, still displayed near the Cathedral for which it was designed, has been exhaustively studied over the years, notably by Charles Stothard and a team led by Sir Frank Stenton. It is generally agreed that the Tapestry was designed and probably sewn in England, perhaps at Canterbury, for Odo, bishop of Bayeux and Earl of Kent, half brother to William the Conqueror, probably at the time of the consecration of the Cathedral at Bayeux (1077) and almost certainly before Odo's disgrace in 1082.

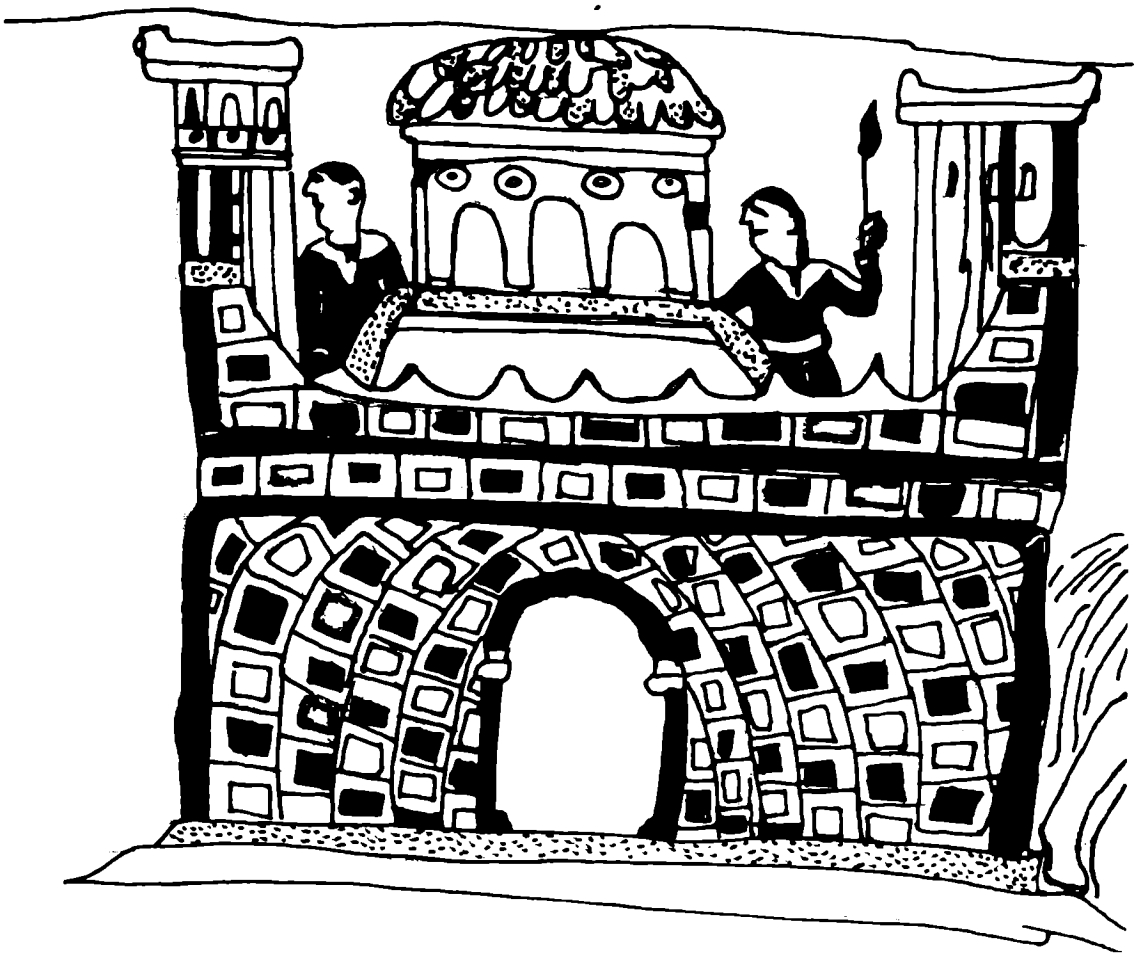
The first part of the Tapestry depicts Earl Harold's adventures in Normandy. Captured by Guy, Count of Ponthieu, Harold is taken before William, Duke of Normandy. But first, a message is sent to William, shown seated in front of the structure reproduced here. The place is probably Rouen, the capital of Normandy at the time.

The ducal palace at Rouen was founded in the early 10th century at the SW corner of the gallo-roman enclosure. It had a tower, strengthened by King Henry I, who was also Duke of Normandy between 1105 and 1136. This palace was destroyed by Philip II of France soon after Normandy was lost to the French in 1204. Philip enlarged the city of Rouen, and built a new fortress further N, of which the Tour Jeanne d'Arc survives. The old castle's site, about 100 metres W of the cathedral, is still called La Vieille Tour(Héliot 1955).

It has been suggested by Professor Allen Brown that Rouen was the model for the palace-keeps at Colchester and London, begun c. 1075, Colchester certainly and London possibly, were originally only one storey high (Drury, 1982; Sturdy, 1979). The Normans built their keep at Colchester around the podium of the ruined Roman temple, perhaps because they realised that it was hollowed-out with tunnel-like vaults which would not have borne new masonry safely. The artist of the Tapestry may have known these three buildings, either personally or from others' descriptions.

My own interpretation of the Bayeux Tapestry is that the central feature is a motte (shown in section) topped by a tower with a shingled roof: compare the drawings of the castles at Dol, Dinan, Bayeux and Hastings further along the Tapestry. The motte is surrounded by a wall built of squared stones, with turrets at the corners. The saw-edged crest to the wall may be a representation of crenellations, or just possibly the ridgetiles of a roofed building inside the wall.

The central entrance, with its round arch supported on columns with capitals and bases, is similar to those shown at Bosham Church and Westminster Palace and Abbey elsewhere in the Tapestry. The 'masonry' surrounding the Rouen door is, however, uniquely drawn concentrically to the arch and jambs, looking as if it is an attempt at perspective drawing of a tunnel-vault giving access to the city, or even into the base of the motte. Tunnels into castle mottes are known in England and France (Beamon et al., 1982) and at South Mimms in Hertfordshire the foundation of a flint lined tunnel running into the base of a timber tower has been excavated (Kent, 1968).



But I must end on a note of caution. The similar doorway to the
Westminster Palace is shown surrounded by square stones set diagonally (and such stonework can be found surviving in the reredorter of Westminster Abbey today). Also, there are two other doorways in towers set about with lattice-patterned 'masonry' (one perhaps being a Rouen gatehouse), a pattern easier to embroider than the one discussed above. It may be that recent scrutiny of the Tapestry before its rehanging may show that the feature is due to a repair. But the Tapestry's minute details have so frequently been confirmed by archaeological research that one day further evidence of the Rouen tunnel may be found.

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